

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Early Specimens of Mild Bessemer Steel.

The great and growing range of usefulness which steel, and especially that of the mild class, is rapidly conquering, is the outgrowth of superior qualities, now generally acknowledged and appreciated. The treatment which the metal requires is more generally understood, so that complaints of "mysterious behavior," "unaccountable failures," are of less frequent occurrence. When first largely used for ship plates, steel was often designated as an unreliable, treacherous material, but as these complaints have ceased, there is reason to believe that better handling and manipulation have removed the sources of discontent. Recently Mr. Barnaby, chief constructor of the English navy, submitted to the Iron and Steel Institute a paper embodying his unfavorable experience with steel for angle bars for ships, and it was during the discussion that Mr. Bessemer himself made some remarks and exhibited some specimens,

got. That gun was made in 1858—21 years ago.

A very remarkable sample of mild steel, produced at an early period, soon after the erection of the Sheffield works, 20 years ago, were cups of Bessemer steel, made by pressing a round disk through a hole by a plunger. The idea originated with Mr. Parkes, of Birmingham, who produced copper tubes in this manner by drawing the cups out. Mr. Parkes suggested the substitution of steel for copper, and prevailed upon Mr. Bessemer to make the attempt. A locomotive tube plate 27 inches in diameter and three-quarter inch thick, was placed over a die with trumpet-shaped mouth (see Fig. 1). It was then forced into a cup shape (see Fig. 2), annealed, and by a second pressure in the die, turned in the vessel shown in Fig. 3, 11 inches in diameter, without occasioning the slightest exhibition of weakness on the part of the metal. Another sample of good work performed during the early days of the process, was a rail rolled at Dowlais 22 years ago, from steel, poor in carbon and

removed, and connecting the other end to the shaft driving the rolls. He had carefully measured this sample, and he had found that in a part measuring 6 feet along the center of the web the flanges measured 3 feet 1 inch, they having thus been extended 2 feet 1 inch during the process of twisting. Another sample, illustrated in Fig. 6, was a 4-inch square bar, which had been twisted hot until the angles of the square formed a kind of four-threaded screw, of a pitch varying from  $\frac{3}{8}$  inch to as little as  $\frac{1}{4}$  inch.

In toughness and malleability these old samples have not been probably excelled, and wonderful though the rapid growth of the production of the harder varieties of Bessemer metal has been, it is certainly astonishing that these remarkable results with the milder grades did not sooner rivet attention. It is strange that they did not call forth stronger appreciation, even though they might be the result of the coincidence of favorable circumstances. It is well to remember, now that mild steel is taking

## SCIENTIFIC AND TECHNICAL.

The *Deutsche Allgem. V. Zeitg.* states that Mr. Karl Steinbach has succeeded, after much patient study and research, in

PHOTOGRAPHING MIRROR REFLECTIONS, with the aid of a chemical composition discovered by him. With this composition the mirror surface is painted, and the back part of the mirror receives also a coating of oil. The mirror thus prepared is held before the person who is to be photographed. The oil coating evaporates, and the likeness of the person remains in natural colors on the light surface. The image, so fixed, is brought into a bath, and is exposed half an hour to sunlight before delivery.

M. Clémendot, of Paris, has taken out patents for a method of

### DIFFUSING LIGHT.

which is expected to do away with much of the loss of illuminating power experienced in subduing the brilliancy of, for instance, the electric light by opaque globes. He

justable to zero for any length. In looking through the telescope both scales are seen reflected in the mirrors, whose movement, magnified about 140 times, can thus be measured very accurately. Though by no means new in principle, this optical method of measuring elongation of test bars is novel as applied to investigations of materials under strain. That it will materially aid the latter and render them more accurate cannot be doubted.

Among the numerous apparatus designed to solve the problem of electric lighting, brought out of late, is

### THE HIGGINS ELECTRIC LAMP.

The stand of the lamp is an iron tube 1 foot long, filled with quicksilver, which makes the contact with the lower carbon, which is only one-eighth of an inch in diameter and about 1 foot long. It is plunged into the tube filled with mercury, the pressure of which secures, in a simple manner, contact of the point of the lower carbon with the upper stick, which is somewhat thicker and



Fig. 5—Steel Rail Twisted Cold.

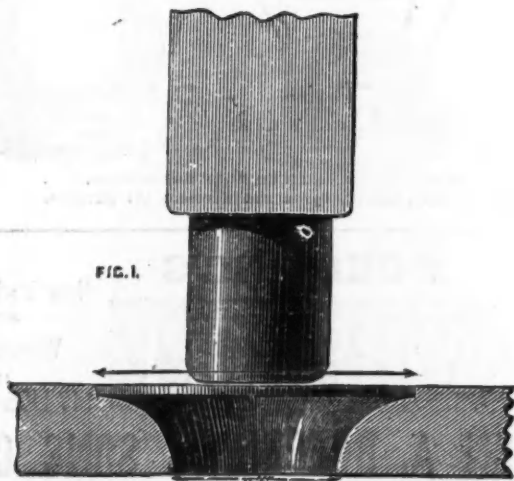


FIG. 1.



Fig. 4.

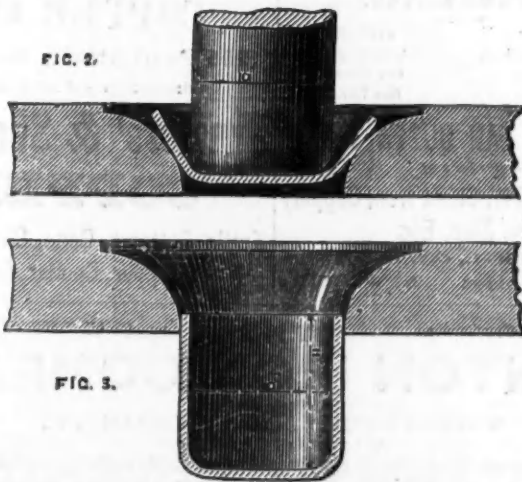


FIG. 2.

FIG. 3.

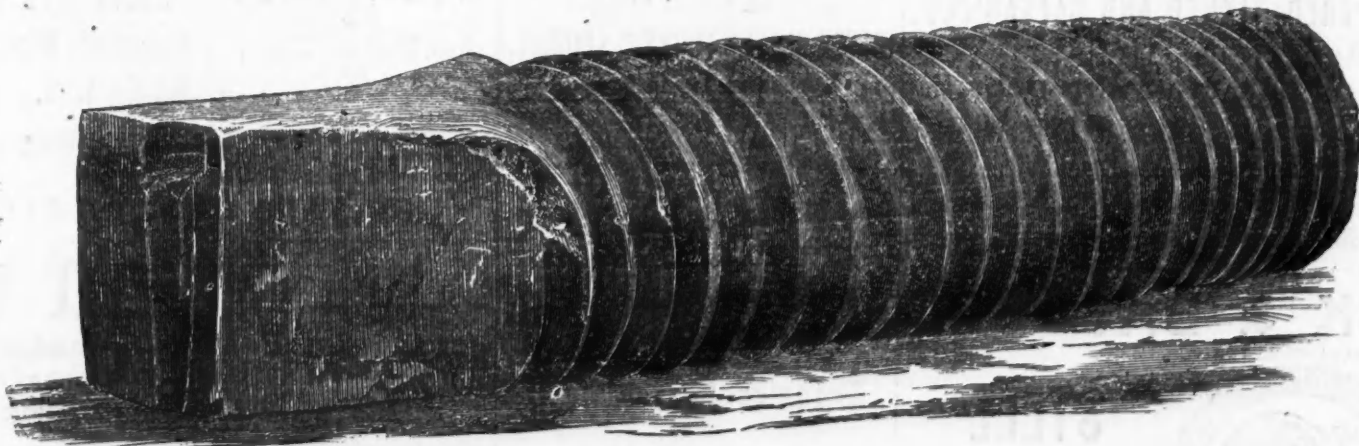


Fig. 6.—Bar Twisted Hot.

EARLY SPECIMENS OF MILD BESSEMER STEEL.

which not alone admirably show the quality of the metal, but prove that its merits were fully exhibited much earlier than is now generally supposed. Thus, for instance, it was distinctly held some time ago, during a controversy on the use of mild steel for ordnance, that the metal now so highly appreciated was unknown 20 years ago. This Mr. Bessemer took pains to disprove, and the statements then made and the samples exhibited (for an illustration of which we are indebted to *Engineering*) were received with so much interest that we give them in the following. In May, 1859, Mr. Bessemer read a paper before the Institution of Civil Engineers, at Cheltenham. He showed on that occasion a little gun made without a weld or joint, the metal of which, according to an analysis by Mr. Riley, held:

Carbon	0.004
Silicon	0.004
Sulphur	0.003
Phosphorus	0.002
Manganese	0.001
Copper	minute trace.

Mr. Riley ascertained the quantity of iron by two analyses, and the quantity was in the

1st. Iron 99.833  
2d. Iron 99.787

Taking the average of these two results, it

will be seen that the metal of the gun con-

tained 99.84 per cent. of iron, which was

perhaps as near to pure iron as could be

rich in phosphorus. A still more interesting specimen, which belonged to the earliest stages of the development of this material, when it was applied to the making of railway bars, for which it was exceedingly well adapted, was a rail rolled by Mr. Ramsbottom. There was perhaps no better practical mechanic in Great Britain than Mr. John Ramsbottom, of the London and North-western Railway. When Mr. Bessemer proposed cast steel for rails to be used for the Northwestern, Mr. Ramsbottom looked upon him with astonishment and almost with anger, and said, "Do you wish to see me tried for manslaughter?" That was the necessary result of the state of knowledge at that period of what could be done with steel. Steel was then only applied for cutting purposes, and it was highly carbonized. He showed Mr. Ramsbottom, whose mind was thoroughly open to conviction, samples, and that gentleman said, "Let me have 10 tons to torture and try them just as I desire." The 10 tons were supplied from Sheffield, and were subjected to the severest torture and twisting that was possible. The sample shown in Fig. 5 was a good sample of the mild steel of those days. It was a piece of steel rail which had been rolled by Mr. Ramsbottom from a portion of the 10 tons just mentioned, and it had been twisted cold by clamping one end in the bearing of a rolling mill from which the rolls had been

the position which its superior merits assign to it, that it is by no means so new as is generally believed, and that 20 years ago it was produced, though perhaps exceptionally only. There are many circumstances which explain the tardy recognition of mild steel. In the early days of the Bessemer process the iron manufacturers who adopted it were without scientific training; they had no practical knowledge, and no experience in this particular process, for the management of which there was no precedent nor analogy in any department of industry. Besides, the profits were large and the competition strong, so that there was no uniformity in the quality of the product of the country or of one establishment. The most extensive field for the sale of the steel was for rails, for which a metal possessing a certain degree of hardness was indispensable. There were other causes equally important, but it would seem that that of cost was not so great as might be imagined. According to a statement recently made by Mr. Bessemer, he offered in 1860 to build a plant for the Royal Arsenal at Woolwich for £3500, and undertook to make fluid Bessemer steel from the highest qualities of English pig iron, ready to pour into the molds, at a net cost not exceeding £6, 10/ (\$31.50) per ton. He adds to this that he is fully prepared to show that steel could be made at that time even below that price.

uses double globes, and fills the space between the two with any material of a flocculent nature, such as glass wool, calcined mica, &c.

At the recent conversazione of the British Institution of Civil Engineers, Prof. A. B. W. Kennedy, of University College, showed

### WILLIS'S MEASURING APPARATUS,

an exceedingly delicate and simple mechanism for measuring very small extensions, deflections and compressions of test bars. Two points, at a convenient distance apart, are marked, and only the extension between these points is measured. By using optical means Willis avoids many mechanical imperfections. The general principle of this system consists in so connecting two plane mirrors to two points on the bar to be tested, that the smallest variation of length of that portion of the bar included between their points of attachment produces an angular displacement of the plane of one or both of the mirrors, this displacement being rendered apparent, in an observing telescope, by the movement across the field of vision of the images of two horizontal scales fixed several feet above the mirrors, and which are so placed with regard to them that their images are formed side by side in the focus of the eye-piece. The scales are carried on rails on a beam fixed to the roof, 11 feet from the mirrors. They are therefore ad-

heavier. The lamp is exceedingly simple, and is said to be quite regular in action, as the pressure between the electrodes is very uniform.

According to the *Moniteur Industriel*, Mr. Gobin has introduced into Belgium

### ARTIFICIAL ASPHALTUM,

called by the inventor "Lyons" asphaltum. Its average composition is 15 parts of bitumen, 35 parts of coal slack, 10 parts by weight of coke powder, 130 parts of lime and 160 parts of fine gravel. The bitumen and coal slack are mixed together in a boiler, and skimmed until the formation of a scum ceases. The coke powder and lime are mixed, heated to about 300 degrees in order to dry them, and then they are added to the material in the boiler. The gravel is embodied in the mixture as the last ingredient.

The Iowa Supreme Court has decided that the innocent giver of a promissory note to a lightning-rod man, a patent rights agent, or other traveling swindler, such note having afterward been raised to a larger amount by such swindler, is not liable for more than the amount of the original and *bond fide* contract. This reverses the ruling of the district courts of that State, and has the effect of protecting many farmers and others who have of late years been victimized by sharpers.



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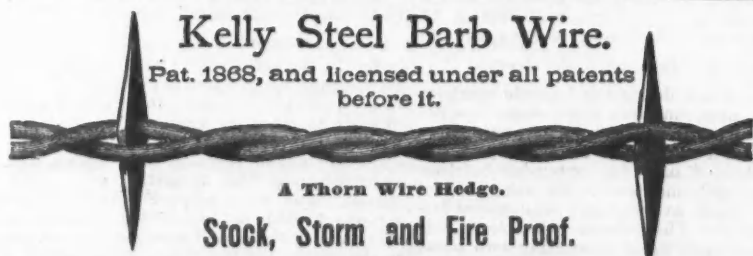
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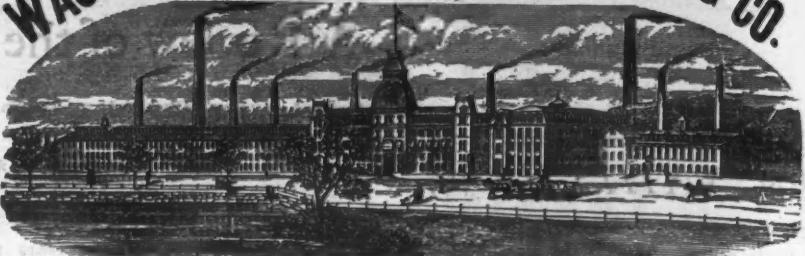
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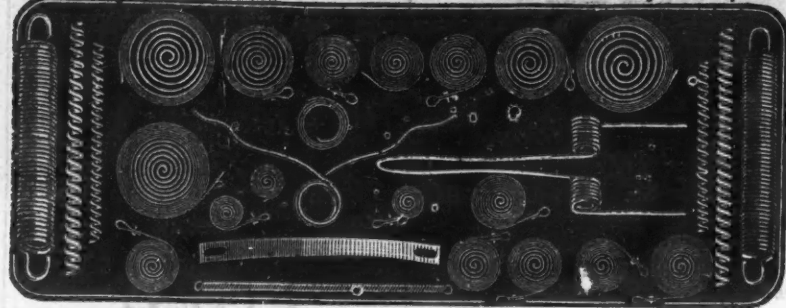
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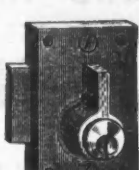
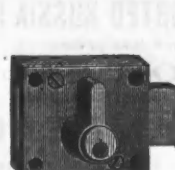
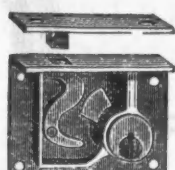
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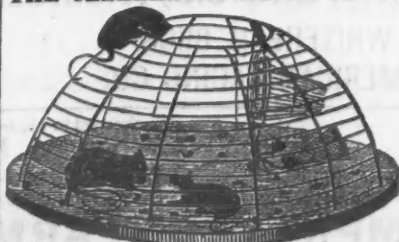
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## British Iron and Steel Institute.

### ANNUAL MEETING.

The last paper read was that of Mr. H. Louis, of Londonderry, N. S., on

### THE CHEMISTRY OF PUDDLING,

in which he gave the following account of the chemical reactions of the puddling process: I will present, in a tabular form, the analyses of the various samples, and shall then endeavor, by a detailed account of the working of the heat, to show exactly at what stage of the process each one was taken:

### Table of Cinder Analyses.

	I.	II.	III.	IV.	V.	VI.
Silica.....	24.04	27.17	27.77	27.46	25.79	15.79
Alumina.....	0.19	.....	.....	.....	.....	.....
Ferric oxide.....	18.74	5.88	4.81	4.19	4.30	9.31
Ferrous oxide.....	51.82	59.50	59.95	58.41	65.61	65.52
Manganese oxide.....	4.48	5.77	5.20	5.43	4.65	3.82
Phosphoric acid.....	1.30	2.12	2.10	2.23	2.07	1.66
.....	99.91	99.30	100.01	97.73	97.23	98.99
Metallic iron per cent.....	52.96	50.02	49.99	48.36	50.08	50.81

### Table of Iron Analyses.

	I.	II.	III.	IV.	V.	VI.	VII.
Silicon.....	1.11	0.14	.....	.....	.....	.....	.....
Carbon (combined).....	0.61	1.89	1.75	1.57	1.10	0.25	0.16
Car. (graphitic).....	1.75	trace	0.09	trace	trace	0.07	.....
Manganese.....	0.78	trace	0.09	trace	trace	0.07	.....
Phosphorus.....	0.36	0.25	0.26	0.23	0.23	0.25	0.09
Silica.....	.....	.....	0.74	1.01	1.37	0.91	0.28

The furnace having been settled with specular ore, and about 1 cwt. of hammer slag thrown upon the bottom and round the sides, at 8.47 p. m. the charge of 2 cwt. of No. 3 and 2 cwt. of No. 4 pig was thrown in, the damper was raised and the blast put on. 9.27. The iron was all melted and rabbling commenced; the damper was lowered and the blast shut off. At this point samples of iron and cinder were taken out in an iron ladle. Their composition is given in Column I of the table of analyses. 9.33. The cinder had risen up to the fore-plate. A little blast was now put on and the damper very slightly raised, to keep the furnace from getting too cold. 9.35. The iron was completely thickened. Samples No. II of iron and cinder were now taken. 9.37. The effervescence was very violent, and the cinder having risen still higher, was running over the fore-plate. 9.40. The iron came up on the boil; that is, it separated and floated on the cinder in the form of small malleable granules. Samples No. III of cinder and iron were taken. This and the following samples of iron can hardly be expected to represent with perfect accuracy the average composition of the iron in the furnace, as, in spite of every precaution, it was found almost impossible to obtain true average samples; they also retain some intermixed cinder, which could not be completely removed. This is the source of the silica returned in the analyses, for it is not likely that at this advanced stage of the process the iron should retain more than a minute trace of silica, if any at all. 9.45. The iron commenced to drop; that is, the granules began to cohere into larger masses and to collect upon the bottom of the furnace. Samples No. IV of iron and cinder were taken. This and the next sample of cinder contained a good deal of finely-divided metallic iron diffused through them. 9.49. The iron had all dropped. Samples No. V were taken. It seems that the changes that had occurred during the last quarter of an hour were physical as well as chemical. 9.50. The iron was loosened and lifted up from the bottom. 9.53. It was turned over for the first time, and was then repeatedly turned backward and forward, opened out and all lumps broken, so that each portion of the loose, spongy mass was thoroughly exposed to the action of the flames and hot air. At this stage considerable oxidation of the iron must necessarily occur, and the amount of ferric oxide in the cinder increase in proportion. This reaction accounts for the excess of ferric oxide shown in cinder analysis No. VI over that in analysis No. V. 10.5. The puddler commenced to ball the iron, the damper having been dropped and the blast shut off. Iron sample No. VI was taken. 10.14. The first ball was drawn. 10.30. The cinder was tapped off, and cinder sample No. VI (—tap cinder) was taken. Iron sample No. VII is a sample of the puddle bar made. It thus appears that the elimination of the carbon and phosphorus takes place principally in two chief periods of action—near the beginning and near the end of the heat. As soon as the iron is well melted and mixed with the cinder, chemical action is set up. Ferric oxide and silicon react, producing ferrous silicate. Carbon is capable of reducing both ferric and ferrous oxides, carbonic oxide being produced. Ferric oxide is also capable of oxidizing phosphorus, and probably manganese, the latter action being assisted by the powerful affinity of silica for manganese oxide. It will be noticed that the puddle bar contains less carbon than the iron just before balling (vide iron analyses, Nos. VI and VII). This is probably due to the continuance of cementation during balling. The percentage of phosphorus is also less, but this may simply be due to the removal of the highly phosphoric cinder by hammering and rolling.

The President read a communication by M. P. Hamet on

### DEPHOSPHORIZATION IN THE BESSEMER CONVERTER BY THE METHOD OF REFINING.

This paper, it seems, was printed in *La Houille* on the 4th of May, and it is claimed by Hamet that as it was read on the 8th as an unpublished paper, M. Hamet was guilty of disrespect to the Institute. We print it, as it represents fairly a direction in which a number of Continental engineers have been working, and which, it seems, they still, notwithstanding recent developments, persist in considering a method full of promise. The silica of the slag, M. Hamet says, is the only obstacle to dephosphorization in the converter. The high temperature favors the formation of phosphates, far from opposing their passage to the slag when circumstances permit. Such are the two principles which ought to serve as a base for all methods having for their object the purification of common pig iron. The problem of

the dephosphorization in the converter is reduced, therefore, to the formation of a slag having sufficient basic force to constantly attract to it the phosphoric acid formed by the combustion of the phosphorus. The less silica the slag contains the stronger will be the basic force obtainable, and the more it will be able to absorb phosphoric acid. The best slag will be that containing no silica, all of whose bases will, in consequence, tend to the formation of a phosphate. Now, in the Bessemer process, whence proceeds this silica, the action of which is so fatal to the existence of phosphates and to the purification of the pigs? (1) From the silicon contained in the iron itself under treatment; (2) from the refractory lining of the apparatus. These are two sources that we must stop or evade to arrive at the object in view. (1) It will be seen that there are no serious difficulties in the way of obtaining a lining essentially basic, containing only traces of silica and behaving perfectly well in the converter. As to the silicon contained in the iron we wish to purify, we cannot think of doing without it. It is the indispensable calorific element in all Bessemer operations. The necessary quantity may vary according to the fashion of working, but we must have it in all cases. A pig that contains only phosphorus in the ratio furnished by ordinary iron ore, would not give off sufficient heat to be convertible into steel. You cannot, therefore, avoid the formation of a certain quantity of silica, provided there be silicon in the pig heated. To prevent this silica from interfering with the oxidation of the phosphorus we may employ two means. First, to neutralize it by strong addition, i. e., to dilute it in such a quantity of basic material that after being saturated will still leave enough free bases to attract the phosphoric acid. One sees what an enormous mass of slag this proceeding, which seems simple and easy at first, creates; but in practice it would be rendered impossible by the small heat at our disposal by the waste of the lining during the first period of the operation, by the irregular purification one would obtain when the pigs had not an absolutely constant composition, by the difficulty of the point of stopping, and by the great waste that it entails. Secondly, instead of attempting to neutralize this silica, as has been done already for the last 10 years, it is more rational to take it away completely as soon as produced, profiting also by the heat given off by the combustion of silicon, without having to trouble as to the smaller or greater quantity of silica formed. Such is the idea that after much consideration has led to the method of re-pouring—a simple method with a certain application—that I desire to speak of briefly. The Bessemer process is, therefore, divided into two distinct periods. The first is an apparatus with ordinary lining, that is to say silicious, where occurs the combustion of the silicon, and the principal accumulation of the heat of the bath. The second is an apparatus with an essentially basic lining, where occurs the combustion of the phosphorus, then of the carbon, and the bringing of the steel to the desired point. The liquid metal is poured from the first vessel to the second either direct or through the medium of a ladle, so as to prevent the passage into the basic apparatus of the silicious matter produced in the first. The re-pouring ought to be done immediately after the combustion of the silicon. We have, therefore, the advantage of being able to treat with regularity pigs containing silicon in a variety of proportions, as all are reduced to the same composition before being introduced into the apparatus where is effected the dephosphorization. The additions of basic materials are constant in quantity for the same ratio of phosphorus in the pig, and whatever be the ratio of silicon, and it is always very small, ought only to serve to neutralize the phosphoric acid produced, and the metal never finds itself in the presence of a large mass of slag troublesome and hurtful. The heat can be regulated at will without hindering the purification. It will do to use more silicious pig without, for that reason, being obliged to add more basic material. The end of the operation is determined by the spectroscopic in the usual way. Thanks to the total absence of silica, the departure of the phosphorus occurs immediately after the pouring, before the oxidation of the carbon, of which the flame serves to guide the operator. The phosphorus disappearing before the carbon, it is not necessary to push the operation to extra soft, or burnt steel; and the waste does not exceed that of pure Bessemer pigs, except as regards the quantity of phosphorus contained in the pig worked. The absence of silica allows of such a complete purification of the pig as could never be obtained with slags containing 15 to 20 percent of it. The loss of heat due to the pouring, and the little necessary additions, is scarcely half of that which the addition alone exacts in the case of non-pouring to arrive at an inferior purification. In fact, the conduct of the process is at least as simple as in the process actually employed for pure pigs. The pigs prepared from the same ores having always the same ratio of phosphorus, the foreman determines once for all the small quantity of basic material that it is necessary to add, and need not further trouble himself, at least as far as the final purification is concerned, of the conduct of the blast furnace. The first converter, in which ought to take place the elimination of the silicon, is made with ordinary lining—i. e., silicious. Nevertheless, a neutral (or carbon) lining does also very well. The complete departure of silicon is then more rapid, and the lining does not suffer so long as you do not seek to remove carbon in this first period. A basic lining could be used, but the waste would be very rapid. As to the second converter, in which ought to be effected the dephosphorization after the removal of the silicious slag, its lining must be essentially basic, and contain the smallest quantity of silica. To this effect, several sorts of basic materials could be used. The first (best) is certainly the old pure magnesian brick, whose only drawback is its high cost. For ordinary use we can be content with materials less refractory and more cheap and easy to obtain—lime mixed with a little oxide of iron; calcined dolomite, either alone or mixed with a little iron ore; and bauxite, with a little lime, furnish ex-



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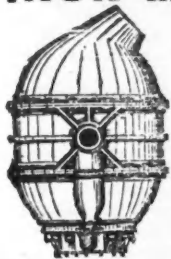
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**Edward J. Etting.**  
IRON BROKER AND COMMISSION MERCHANT  
230 S. Third St., Philadelphia, Pa.  
**Boiler Plate, Tank Iron, &c.,**  
**PIG, BAR AND RAILROAD IRON.**  
**Old Rails, Scrap, &c.**  
STORAGE WHARF & YARD,  
DELAWARE AVENUE ABOVE CALLOWHILL STREET,  
connected by track with Railroad.  
Cash advances made on Iron.

**Chester Iron Company's  
BESSEMER ORES.**

NEW PRICE LIST, March 15, 1879.  
S. W. Hill, Birch Tree, Tunnel and East Cut Ores,  
\$2.75, L. O. B. Hacklebarney (most recent analyses,  
\$2.37, 241, 237, 238, 235 phosphorus).  
Upper Tunnel, George and North Veins, \$2.60.  
"Red" Ore, \$3.00.  
**J. WESLEY PULLMAN, Treasurer,**  
467 Walnut St., Philadelphia.

D. W. R. READ. T. HORACE BROWN.  
**D. W. R. READ & CO.,**  
General Commission Merchants,  
**ORES, METALS, &c.**  
Spanish, Algerian and Domestic Ores of  
Iron, Manganese, &c.  
205½ Walnut St., PHILADELPHIA.

**RAILROAD IRON**  
T Rails,  
16, 18, 20, 22, 25, 28, 30, 35, 40, 45, 50, 55, 60 lbs. per  
yard.  
**STREET RAILS OF ALL PATTERNS,**  
24, 26, 28, 30, 35, 40, 45, 47, 50, 55, 60 lbs. per yard, in  
stock or made to order.  
Book of sections furnished on application.

**EDWARD SAMUEL & CO.,**  
332 Walnut St., Philadelphia.

**J. W. HOFFMAN & CO.,**  
Iron Merchants & Railway Equipments.  
208 South Fourth St., Philadelphia.  
Sole agents Glasgow Iron Co. and Pine Iron Works  
manufacturers of Muck Bar and all grades of Plate  
Iron. Celebrated "Glasgow" and "Pine"  
brands for fire boxes and difficult ganging. Pig and  
Bar Iron, Rails and all shapes in Iron. Quotations  
given on Bridge and Building Specifications.

**THE  
STANDARD  
STEEL  
WORKS.**  
LOCOMOTIVE AND CAR WHEEL TIRES,  
Manufactured from the celebrated OTIS STEEL  
BRAND  
STANDARD.  
Quality and efficiency fully guaranteed. Prices as  
low as any of the same quality. We manufacture  
Heavy and Light Forgings, Driving and Car Axles,  
Crank Pins, Piston Rods, &c.  
Works at Lewistown, Pa.  
Office, 220 S. 4th St., Philadelphia, Pa.

**The Iron-Masters'  
LABORATORY.**  
Exclusively for the  
Analysis of Ores of Iron, Pig and Manufactured  
Iron, Steels, Limestones, Clays,  
Slags and Coal for Practical  
Metallurgical Purposes.  
No. 339 Walnut St., Philadelphia.  
**J. BLODGET BRITTON.**

This laboratory was established in 1866, at the in-  
stance of a number of practical Iron Masters, ex-  
pressly to afford prompt and reliable information  
upon the chemical composition of the substances  
above mentioned, for smelting and refining pur-  
poses. The object being to make it at once a con-  
venient, practically useful, and comparatively inex-  
pensive adjunct to the Furnace, Forge and Rolling  
Mill.

**CHARGES TO IRON WORKS.**  
For determining the per cent. of Pure Iron in  
an ordinary Ore..... \$4.00  
For the per cent. of Pure Iron, Sulphur and  
Phosphorus in do..... 12.50  
For each additional constituent of usual oc-  
currence..... 1.50  
For those of unusual occurrence or difficult  
to determine, the charge must necessarily  
depend upon circumstances.  
For determining the per cent. of Sulphur or  
Phosphorus in Iron or Steel..... 7.00  
For each additional constituent of usual oc-  
currence..... 5.00  
For the per cent. of Carbonate of Lime, and  
insoluble Silicious Matter in a Limestone..... 10.00  
or each additional constituent..... 2.00  
or the per cent. of Water, Volatile Combus-  
tible Matter, fixed Carbon, and Ash in Coal..... 12.50

For determining the constituents of a Clay, Slag,  
Coke, or of an Ash in Coal the charges will corre-  
spond with those for the constituents of an ore.  
For a written opinion or letter of instruction the  
charge must necessarily depend upon circum-  
stances.  
Printed instructions for obtaining proper average  
samples for analysis furnished upon application.

**Connellsville Coke.**  
**FRANCIS WISTER,**  
330 South Third Street, Philadelphia.  
Best Coke for Furnaces and Foundry Use.

cellent linings. One can also mix at high  
temperature lime and magnesia by the addi-  
tion of silica or clay, but we must then ex-  
pect a less perfect purification of the pig.  
It would be imprudent to indicate just now  
a basic lining that would be suitable to all  
makes of steel. When the time arrives,  
each will adopt, according to circumstances,  
that which presents the best conditions for  
quality and economy. One can only affirm  
that nowhere will one meet on this head any  
serious difficulties.

During the proceedings, Dr. Siemens offered,  
through the Council of the Institute, \$10,000  
in aid of the construction of a building for  
the Iron and Steel Institute and kindred societies,  
on a suitable site at Westminster, an offer which, it need hardly  
be added, was unanimously accepted.

#### METALLURGICAL NOTES.

##### THE TREATMENT OF AURIFEROUS AND ARGENTIFEROUS PYRITES.

The trouble experienced in dealing with  
"sulphurets" is so well known that it will  
be unnecessary to say that every new method  
which will serve to reduce the cost and the  
losses of extracting gold, silver and copper  
from ores running high in pyrites, deserves  
attention. A recent modification of known  
methods is that proposed by Mr. W. A. Dixon,  
who has made a series of experiments  
to test its value, so far as laboratory  
work can accomplish that object. He roasts  
the ore on a matte smelted from the ore  
in a muffle roasting furnace, and utilizes the  
sulphurous acid formed for the manufacture  
of a dilute sulphuric acid, in suitable com-  
bination chambers and condensation towers.  
Any arsenious acid formed is deposited in a  
flue previous to the gases entering the com-  
bination chamber. So far the process does  
not in any way differ from existing methods.  
Before being discharged from the muffle fur-  
nace the roasted ore is mixed with a proper  
amount of coal dust or any other carbon-  
aceous matter, and then it is transferred to  
a reverberatory furnace, in which a re-  
ducing flame is maintained. This reduces  
the oxides, formed in the preliminary roast-  
ing, to metals. The material is then carried  
into vats, where a large portion of the iron  
is extracted by means of the acid solution  
from the towers in the shape of a sulphate.  
The residue, which contains free gold and  
silver, is amalgamated. If copper is present  
in considerable quantities, the process is  
somewhat modified. The ore, after having  
been roasted in the muffle furnace, is lixiviated  
with an acid solution of copper, and  
then with water. The residue is mixed  
with carbon and treated further in the man-  
ner described. The process is claimed to  
possess the advantage of suffering less from  
poor roasting and of being conducted at a  
low temperature, with its attendant decrease  
of cost of fuel, of plant and of loss by  
volatilization. There is none of the expense  
connected with chlorinizing roasting nor  
any outlay for precipitants.

##### LARGE OUTPUT OF ANTHRACITE BLAST FURNACES.

In addition to the data which we published  
recently on the output of anthracite blast fur-  
naces, we would give the following, communicated  
to the *Bulletin*: The three furnaces of the  
Lackawanna Iron and Coal Company made,  
in two successive weeks ending May 24  
and May 31, respectively, in tons of 2240  
lbs.:

No.	Furnace (67 ft. by 21½ ft.)	Tons. Cwt.	Tons. Cwt.
No. 1	Furnace (67 ft. by 21½ ft.)	478 7	476 11
No. 2	Furnace (67 ft. by 21½ ft.)	400 17	431 24
No. 3	Furnace (70 ft. by 21½ ft.)	400 7	398 10
Total		1,379 11	1,306 4

The Dunbar Furnace, at Dunbar, Pa., 77 x 20  
feet, made in a 30-day month 2182 tons (2240  
lbs.) of pig iron on 83 bushels of coke to the  
ton; the ores yielded for that month 42.5  
per cent. of metallic iron. The furnace of the  
Durham Iron Works at Riegelsville,  
Bucks County, Pa., measuring 76 x 20 feet,  
made 425½ tons (2240 lbs.) of pig iron in  
the week ending May 31.

##### ON THE METALLURGY OF PLATINUM AND IRIIDIUM.

Contributions to the metallurgy of the  
metals of the platinum group are so rare,  
and the information given in text books so  
meager, unsatisfactory and superannuated,  
that a brief description of present practice  
will be welcome. This has been furnished  
recently by Mr. George Matthey, of the fa-  
mous platinum smelting and manufacturing  
firm of Johnson, Matthey & Co., of London,  
in a paper read before the Royal Society.  
According to this—probably the best author-  
ity living—the commercial platinum is  
melted with six times its own weight of pure  
lead; the alloy granulated and treated in di-  
lute nitric acid until fresh acid fails to act.  
This dissolves out the greater part of the  
lead, and the copper, iron, palladium or  
rhodium which may be present. The residue,  
a black powder, is dissolved with weak  
*aqua regia*, which leaves behind a residue  
consisting of all of the iridium and a portion  
of the platinum contained in the black pow-  
der. After evaporation of the solution of the  
chlorides of lead and platinum, a suffi-  
cient amount of sulphuric acid is added to  
effect the precipitation of the lead as sul-  
phate. The chloride of platinum is dis-  
solved out with distilled water, and precipi-  
tated with an excess of chloride of ammo-  
nium and sodium. The whole is then heated  
and allowed to stand for some days, the  
ammonio-chloride of platinum settling down  
as a fine deposit, while any sodium, if pre-  
sent, will remain in solution, which has a  
rosy tinge therefrom. In order to effect a  
purification of the platinum precipitate, it is  
dried, and after adding bisulphate of po-  
tash, with a small proportion of bisulphate  
of ammonia, it is subjected slowly to a dull  
red heat. Thus the platinum is reduced to  
a black, spongy, porous mass, while the  
rhodium is obtained in the shape of a bisul-  
phate of rhodium and potash, soluble by  
digesting with boiling distilled water. A  
small quantity, it is true, is dissolved as a  
sulphate together with the rhodium salt, but  
it is regained by heating the residue after  
evaporation to redness, at which heat the  
platinum salt is reduced to a metallic con-  
dition, while the sodium salts remain un-  
decomposed. The platinum obtained as a

spongy mass from the heating of the chlorides  
is melted, and yields a pure metal, having a  
specific gravity of 21.46, the highest attain-  
able. The iridium obtainable from its ordi-  
nary solution is quite impure. Mr. Matthey  
fuses it with lead, dissolves out the lead with  
nitric acid, and fuses the residue with bisul-  
phate of potash, by which the rhodium is  
removed. Then it is melted with 10 parts of  
caustic potash and 3 parts of nitric for a  
long time, and the cold product is lixiviated  
with water, which dissolves out the ruthen-  
ate of potash, while the corresponding iridium  
salt remains behind as a blue powder which,  
after being washed with hypochlorite of soda,  
is mixed with a strong solution of  
that reagent and slowly heated to the boiling  
point in a distilling vessel, thus removing the  
ruthenium. The blue powder is then dis-  
solved again in *aqua regia*, evaporated to  
dryness, redissolved in water, filtered, and  
the dark colored solution thus obtained  
poured into a concentrated solution of soda  
and hypochlorite of soda. Iridium is then  
precipitated as an oxide by passing chlorine  
through the solution, and the precipitate so  
obtained is reduced by the combined action  
of carbon and carbonic oxide, generated by  
heating gently a mixture of oxalic and sul-  
phuric acid. The metal so prepared is puri-  
fied by subjecting it to the action of chloro-  
mic water and hydrochloric acid, and is  
then cast into ingots, having a maximum  
specific gravity of 22.38. Mr. Matthey uses  
the metal in the preparation of malleable  
and ductile alloys of platinum and iridium,  
holding 10 to 20 per cent. of the latter.  
These are claimed to combine the more val-  
uable physical properties of both the metals  
in an exceptional manner. It has much  
of the malleability of platinum and the  
hardness of pure iridium.

##### A Brickmaking Center.

Along the banks of the Hudson from Tar-  
rytown to Albany are upward of 150 brick-  
yards, varying in productive capacity from  
20,000 to 140,000 bricks a day in the work-  
ing season. The greater number are on the  
west bank of the river, which furnishes an  
inexhaustible supply of proper material.  
The sand is usually found at the surface,  
and the clay a few feet below, although the  
latter is frequently obtained at the surface  
and the sand at another point near at hand.  
The tempering machines and brick presses  
are now nearly all run by steam power;  
but the material is still carted by horses,  
and all other parts of the labor are per-  
formed by hand. The wages paid last  
year ranged from 60 cents to \$3 a day,  
according to skill and ability, "boss" burn-  
ers getting the highest wages and boys  
the lower rate; the average being about  
\$1.25 a day. The leading establishments—  
70 or more in number—have together a daily  
capacity of more than 4,000,000 bricks.  
Various other small brick firms exist on the  
river, of which trustworthy data could not  
be obtained, and doubtless not far short of  
400,000,000 bricks are made here in a single  
season, by about 4,000 men and boys; an  
average of 100,000 each. The great brick  
center is Haverstraw Bay, where about 40  
separate manufacturers are established, in-  
cluding the largest on the river. Haver-  
straw and vicinity are especially adapted for  
the work, and their bricks usually lead the  
market, although various other makers  
claim to produce an article equally good. In  
burning this immense quantity of brick it is  
estimated that 40,000 cords of wood have  
been consumed, and the labor of cutting and  
hauling this is not easily realized. Cordts  
& Hutton, of this city, claimed to have  
burned last season the largest kiln ever  
burned above the Highlands; it contained  
2,250,000 bricks.

**The Manufacture of Phosphorus.**  
Various mineral phosphates, said Mr. James  
Readman, before the Glasgow Philosophical  
Society, are now used in the manufacture of  
phosphorus. Bone ash is no longer re-  
munerative, on account of its high price.  
Among the varieties of mining phosphates  
are Canadian, German or Nassau, Charles-  
ton and Sombrero phosphates. The first  
stage in the manufacture of phosphorus is to  
decompose the phosphate of lime completely  
in a large cylinder with sulphuric acid of  
110° to 120° Twaddell, with constant agi-  
tation. The sulphate of lime is then filtered  
off, and the filtrate is evaporated to about  
80° or 90° T., and then allowed to cool. It  
contains over 25 per cent. of phosphoric  
acid. It is then mixed with coarse wood  
charcoal and dried in a muffle furnace.  
The proportion of charcoal to liquor is one  
to five. This substance contains the phos-  
phoric acid in a partially insoluble state, so  
that it is different in its properties from  
meta-phosphoric acid. The mixture is then  
transferred to retorts of Stourbridge clay,  
capable of holding 30 to 40 pounds. The  
malleable iron pipe through which the phos-  
phorus distills is then luted on, and the heat  
is raised to bright redness. The phosphorus  
distills over and is condensed in water.  
It only remains to cast it in molds, when it  
is sent to market. Mr. Readman, in con-  
tradiction to usual assertions in text books,  
called especial attention to the fact that  
mono-phosphate of lime is not used as a  
source of phosphorus, for the lime takes up  
valuable room, and the compound requires a  
much more intense heat to effect its decom-  
position. Redonda phosphate of aluminum  
is regarded by the author as the future  
source of phosphorus, but as yet no attempt  
to procure phosphorus from it has been pec-  
uniarily successful.

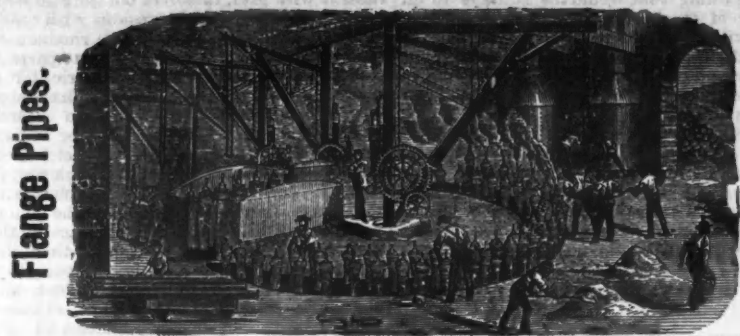
**Overloading Freight Cars.**—It is but a  
short time since 20,000 pounds was the  
standard weight of a car load, but a re-  
markable increase in weight has now come  
into general practice. The following figures  
of maximum and average weights of a large  
number of cars, something like 2000, sent  
from Philadelphia westward, are given by  
the *Railway Age*:

Load.	Maximum weight.	Average weight.
Lumber.....	21,000	20,781
Ties.....	26,000	22,338
Balls.....	26,800	25,859
Agricultural implements.....	20,700	22,972
Wagons.....	32,550	24,583
Coal.....	30,800	23,494
Machinery.....	29,250	24,533
Stones.....	27,500	24,500
Iron.....	24,100	24,000



## McNEALS & ARCHER,

BURLINGTON, N. J.



### CAST IRON PIPES

FOR WATER AND GAS.

ESTABLISHED IN 1848.

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MANUFACTURERS OF ALL KINDS OF

HAMMERED AND ROLLED

## STEEL,

Warranted Equal to any Produced.

### BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives, Cold-Chisels and Machinists' Tools generally.

### SAW PLATES

For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

### Sheet Steel

For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws, Stamping Cold, &c., &c.

### SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Boilers, Fire-Boxes, Smoke Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement is unequalled for surface finish and exactness of gauge.

### ROUND MACHINERY CAST STEEL

For Shafting, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, R. R. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c., Cast and German Spring and Flaw Steel.

"Iron Center" Cast Flaw Steel. Finished Rolling Flaw Counters with Patent Screw Hubs attached.  
"Soft Steel Center" Cast Flaw Steel. Agricultural Steel cut to any pattern desired.  
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Represented at 59 BEEKMAN ST., NEW YORK, by

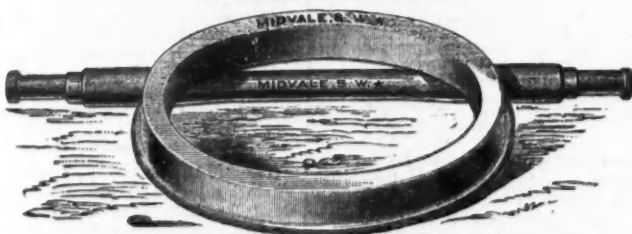
HOGAN & BURROWS, Gen'l Agents for Eastern and New England States.

## MIDVALE STEEL WORKS,

CRUCIBLE AND OPEN HEARTH STEEL.

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OF EVERY DESCRIPTION.



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ESTABLISHED 1847.

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## CHILLED RAILROAD WHEELS

For every kind of service, including Street, Mine and Lumber Tramways. Wheels furnished in rough, bored or on axles. Chilled castings made to order.

## PENNSYLVANIA STEEL COMPANY,

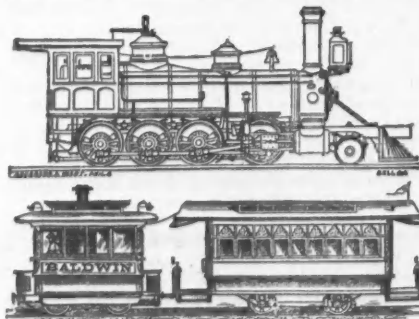
Steel Rails, Frogs, Crossings & Switches.

Forgings for Piston Rods, Guide Bars, Wrist Pins and Machinery Purposes.

Works at Baldwin Station, Pennsylvania Railroad, near Harrisburg, Pa.

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of every Description.

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For city and suburban Railways.

These machines are nearly noiseless in operation; show no smoke with the use of anthracite coal or coke as fuel, and show no steam whatever under ordinary conditions of service. They can be run at two or three times the speed of horse cars and draw additional cars. Circulars with full particulars supplied.

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Address JOHN W. QUINCY, Manager, 98 William St., N. Y.

This Steel is made from Chromium and Iron, and is remarkable for Strength, Durability and Uniformity. Send for Circular, where the proof will show it does 25 to 75 per cent. more than other cast steel. It is adapted to all kinds of work where cast steel is used. Chrome Steel Castings from 25 to 500 lbs. to order.

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Manufacturers of and Dealers in

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Proprietors of the Sewanee mines, capacity of 50,000 bushels of coal and coke per day. Several important institutions of learning, including the University of the South, also the celebrated Beersheba Springs, are located upon the line of this Railroad. Being also the proprietors of several extensive tracts of very fine lands, offer special inducements to colonies. Communications addressed to the General Manager will receive prompt attention.

## T. J. BROWN,

Rockwood, Tenn.

Miner and Contractor of Fossiliferous Ores.

A superior article delivered at low figures at any furnace within the district or at any point on the Ohio River. Refer to Roane Iron Co., Chattanooga Iron Co., or S. B. Lowe, Chattanooga.

## S. B. LOWE,

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Dealer in Charcoal and Coke Pig Iron for Foundry, Forge or Car Wheel purposes. Chattanooga, Tenn.

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## TAYLOR & BOGGIS,

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## IRON AND STEEL DROP FORGINGS

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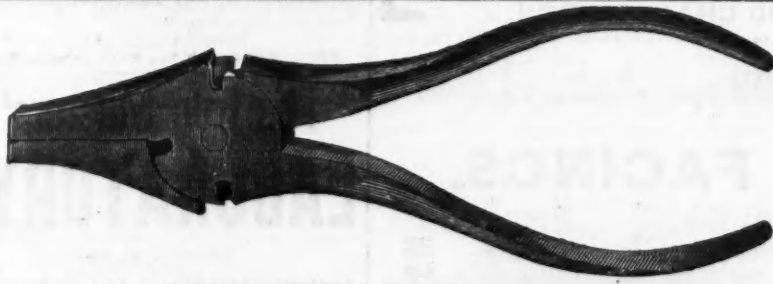
36th & Filbert Sts., West Philadelphia.

## RICHARD P. PIM, Wilmington, Delaware,

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## REFINED AIR FURNACE MALLEABLE IRON, IMPROVED PROCESS,

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Specially Adapted for Use on Wire Fence.

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Price List on application.

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Nos. 6, 7, 8, 9 and 10, for using plain.

Nos. 12, 12½ and 13, for making into Barb Wire.

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Send for prices and samples.

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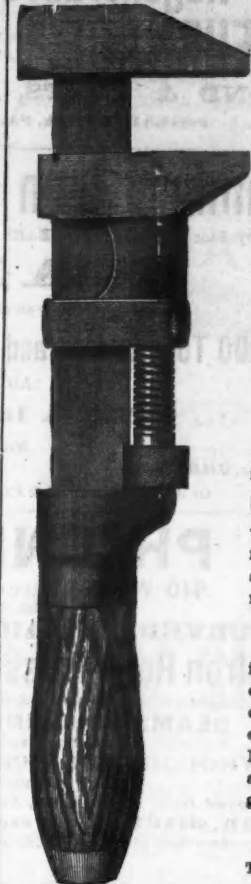
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WARRANTED.



FOR

STRENGTH

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Durability

IT HAS

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GUARANTEED

IN

EVERY RESPECT.

Wrought Bar, Head

and Screw.

Owing to the in-

creased demand

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Popular Wrenches,

we are now manu-

facturing more than

any other establish-

ment in the world.

Our Wrench hav-

ing been imitated by

other manufactur-

ers, we have adopt-

ed the above Trade

Mark, and will here-

after stamp all our

goods.

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SEAMLESS DRAWN

COPPER AND BRASS TUBES,

TACK PLATES,

Forgings of every description.

Bridgewater Iron Co.'s

HORSE NAILS.

PRICE LIST.

Nos. 5 6 7 8 9 10

Per lb. .50¢ .55¢ .60¢ .65¢ .70¢ .75¢

Liberal discounts to the Trade.

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### Coal.

A. PARDEE, Hazleton, Pa. J. G. FELL, Phila.

## A. PARDEE & CO.

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MINERS AND SHIPPERS OF

## Lehigh Coals.

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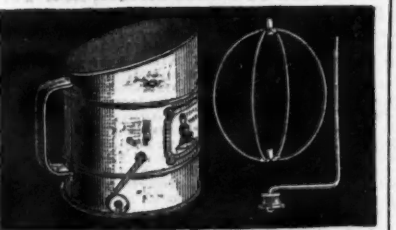
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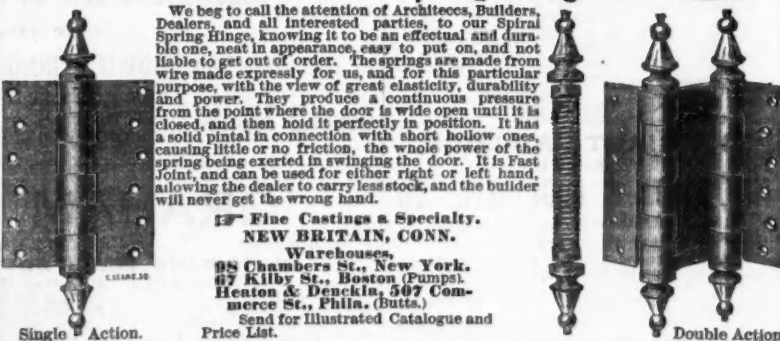
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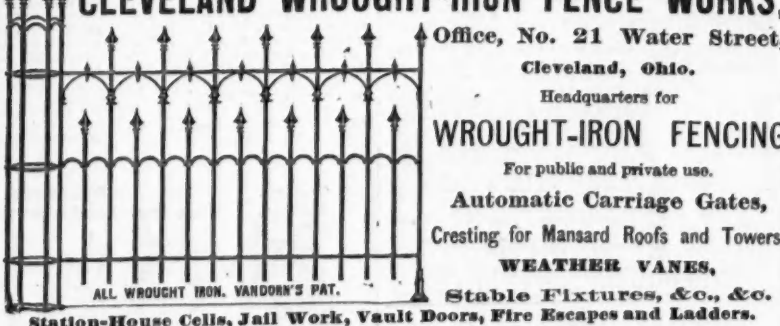
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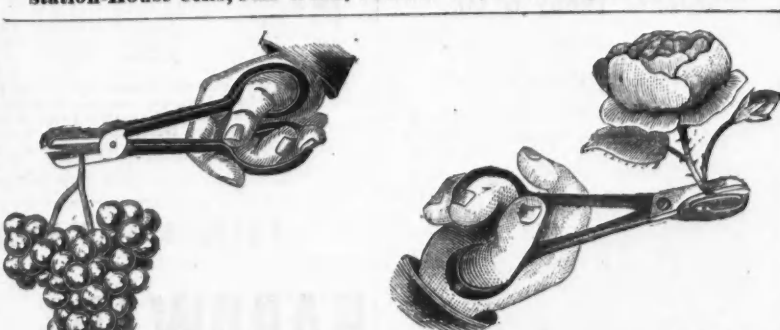
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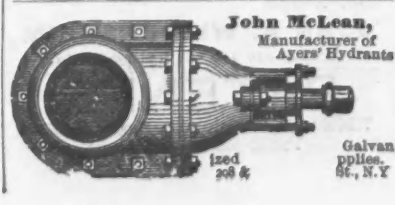
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**R. ARMIGER & SON,**  
Manufacturers,  
12 Second Street, Baltimore, Md.



**Production of Iron and Steel in France  
in 1878.**

The *Journal Officiel* has published a report  
on the state of metallurgy in France during  
1878, based on statements and figures fur-  
nished by the various establishments en-  
gaged in the production or manufacture of  
iron. The production of pig iron remained  
to all intents and purposes stationary, the  
figures for last year compared to those for  
1877 showing an increase of only 1420 tons.  
The total amount produced was 1,508,246  
tons, most of which came from the Meurthe-  
et-Moselle. Pig produced with the aid of  
coke is greatly in demand, and is driving out  
charcoal pig and mixed sorts. The weak-  
side in the tabulated results of the metal-  
lurgical productions for 1878 is under the  
head of manufactured iron, of which only  
681,675 tons were produced, as compared to  
745,045 tons in 1877, and from 10,000 to  
20,000 tons more during the years 1872-74.  
All the great ironworks in the country are,  
therefore, maintaining an expectant attitude,  
says the *Ironmonger*, relying on the good  
things promised by the Freycinet schemes.  
Iron plate shows a diminution of 6000 tons  
over 1877. Forge and mill owners in the  
eastern department, to show the important  
place their establishments hold and their  
value in the general economy of France—  
but more with a view to interest the govern-  
ment in their concern and influence legisla-  
tion—state that their factories pay out in  
wages a sum of \$15,000,000 a year, and that  
their total production in manufactured goods  
is over \$42,000,000, each ton so produced re-  
quiring to produce it some 10 tons of raw  
material, including coal. Their works pos-  
sess the necessary plant to produce 260,000  
tons of steel. In fact, the latter figure was  
exceeded last year, for this metallurgical  
center turned out 270,935 tons of cast,  
Bessemer, puddled, forge, or cemented steel,  
besides 7652 tons of crucible steel, and  
10,740 tons of steel plate. On these two last  
items there is a falling-off of 772 tons and  
2548 tons respectively, as compared to 1877;  
yet the production is still 35,880 tons more  
than in former years. However, the falling-  
off of 63,379 tons in the production of iron is  
amply compensated by the increase of 35,880  
tons in the make of steel.

**A Recent Arbitration Decision in the  
English Coal Trade.**

An interesting case in arbitration was  
decided recently in a somewhat singular  
manner for the South Yorkshire and North  
Derbyshire coal trade. It appears that early  
in the beginning of this year the colliery  
owners of that district, which furnishes a  
large portion of the demand of the city of  
London, asked for a 12 1/2 per cent. reduc-  
tion of the miners' wages. On the 17th of  
January, masters and men agreed to submit  
to arbitration. The employers claimed that  
a reduction was necessary, as they were  
working their mines at a loss. They urged  
that the price of coal was continuing to fall,  
and this main point was conceded by the  
men. Other circumstances, notably the re-  
duction of miners' wages in districts com-  
peting with South Yorkshire, were brought  
forward prominently by the masters.  
Few arbitration cases with regard to  
wages have been more fully gone into, or  
the points therein more fully exhausted,  
than that now brought to a conclusion. On  
both sides a vast amount of valuable in-  
formation with regard to the state of the  
coal trade during the last ten years, and the  
prices in particular that were obtained in  
the London markets, have been obtained  
and placed in the hands of the umpire,  
Judge Ellison, showing that nearly 9,000,  
000 tons of coal are annually sent to the me-  
tropolis by sea, canal and railway. It ap-  
pears that properly authorized accountants  
were appointed to examine the books at eight  
collieries selected for this purpose. From  
the evidence handed in by the said account-  
ants, it appeared that during the year 1878  
the average per day earned by each hewer  
or collier was 6/4, and for the present  
year down to Feb. 26, 6/3 per day; but it  
was stated that, in estimating the average  
wages, no estimate had been allowed by the  
accountants for expenses such as oil, tools,  
&c., paid for by the miners. The account-  
ants also found that the total wages paid to  
every underground workman, including col-  
liers and trimmers, in the year 1878, was  
\$57. 4/8 for each man and boy employed,  
on an average of 5/1 (\$1.23) per day, divid-  
ing the amount by the average number of  
men and boys employed underground. The  
umpire said he agreed with the general  
proposition so far as the wages of miners  
would admit them to give their assistance to  
the masters; but it appeared to him that  
the wages now received by the miners were  
barely sufficient to provide a decent main-  
tenance for themselves and their families.  
That considering the arduous toil they un-  
dergo, and the constant risk of life and  
limb to which they are exposed, their wages  
—coupled with the wages paid in respect to  
other labor—cannot be said to be excessive,  
and that, having taken into his con-  
sideration all the matters referred to, having  
perused the documents laid before him, and  
having fully heard the parties on both sides,  
he awarded that there should be no present  
reduction in the wages of the miners within  
the area of that arbitration, "provided al-  
ways that this award is not intended, and  
shall not be construed, to restrict or in any  
way interfere with the right of owners to  
close, at their discretion, all or any of the  
collieries within the said area."  
Against the ground thus taken by the um-  
pire, that there is a minimum rate of wages  
below which no conditions of trade, however  
bad, can affect it, our English contempor-  
aries take strong exception. The *Coal and  
Iron Trades Review* says: "The arbitrator  
has decided not the rate at which, in his  
opinion, it is possible for the employer to  
carry on operations at his pits without in-  
curring unreasonable loss, and thus find  
work for his men, but the wages which a  
miner shall have in order to obtain a decent  
livelihood. Practically, he says it is better  
that the miners should have no work at all  
than work for wages at which they will  
have difficulty in obtaining a decent living,  
and the employers must do the best they

can. If they cannot afford to pay the men  
the minimum rate they must close their pits.  
But this was not the question he was asked  
to decide; it really was to settle the wages  
which the current condition of the South  
Yorkshire coal trade would allow. Mr. El-  
lison evidently apprehends that his award  
will not enable the employers to keep their  
pits going, for he remarks that "the award  
is not intended, and shall not be construed,  
to restrict or in any way interfere with the  
right of the owners to close, at their  
discretion, all or any of the collieries  
within the said area." This remark, how-  
ever, was unnecessary, for no award can  
limit the right of the owner to stop his pits  
at any time, or can compel him to work at a  
loss; but if he were obliged to keep his  
collieries going, he could not do so indefinitely,  
for, in time, his creditors would step in and  
close up the concern. The question is, would  
it not have been wiser for the men to take  
what wages the pits could afford, rather  
than cause the stoppage of many pits, and  
thus dry up the means of livelihood for a  
large number?"

The grounds of the decision are certainly  
peculiar and without a precedent in the of-  
ficial decrees of arbitrators, although the  
same claim has frequently been put forward  
in discussion.

**The Jablochhoff Electric Light in  
London.**

In accordance with proposals made by the  
proprietors of the Jablochhoff system of elec-  
tric lighting (the Societe Generale d'Elec-  
tricit6 of Paris), a four months' trial was  
made under the auspices of the London  
Metropolitan Board of Works on the Thames  
embankment, the distance between West-  
minster and Waterloo bridges, 7063 feet,  
being lighted with 20 lamps, each one alter-  
nating with one of the existing gas lamps.  
Upon the results thus obtained two eminent  
engineers, Sir Joseph Bazalgette and Mr. F.  
W. Keates, have submitted a joint report  
which is of great interest, as being based  
upon the most accurate information obtain-  
able until now. After a month's regular  
working it was decided to commence the  
trials, which lasted over a period of  
12 nights, 5.5 hours every night. The  
French company supplied two Gramme  
machines, one being used to excite the  
electro-magnets of the other and the lamps.  
Messrs. Ransomes, Sims & Head supplied a  
20-horse portable engine, fitted with a de-  
licate expansion gear, and worked by a high-  
speed governor, which proved so efficient  
that during the 12 nights' experiments the  
greatest difference in the mean number  
of revolutions of each night was only 1.12  
upon an average of 142.36 per minute. The  
consumption of fuel was very moderate for  
a non-condensing engine. The mean indi-  
cated horse-power for 12 nights was 23.34;  
the weight of water used per horse-power  
per hour was 36.8 pounds, and the weight  
of coal consumed 3.86 pounds, including, as  
we understand, the fuel used to get up  
steam. The 23-horse-power given out by  
the engine was expended as follows: In  
driving the engine, straps and shaft-  
ing, 5.19-horse-power; in driving the  
engine, gearing, and two machines, no  
current passing, 7.21-horse-power; when  
the current passed between the two ma-  
chines the power rose to 9.17-horse-power;  
on putting five lights in circuit the power  
was 13.17-horse-power, with two circuits  
and ten lamps, 17.93-horse-power; with  
three circuits and fifteen lamps, 20.75-horse-  
power; and with four circuits and twenty  
lamps, 23.34 indicated horse-power. Using  
the power absorbed in overcoming friction  
as a negative constant, it follows that with  
five lamps in circuit the net power required  
was 1.59-horse-power per lamp; with ten  
lamps it was 1.27; with 15 lamps, 1.03, and  
with twenty lamps 0.92-horse-power, so that  
there was a distinct increase in economy ef-  
fected by augmenting the number of lights.  
The value of the light obtained was es-  
timated under three different conditions:  
1, the naked light; 2, the light shielded with  
an opal globe, and 3, the same light within  
a frosted globe. An ordinary photometer  
was employed with a standard sperm oil  
lamp, consuming 925 grains per hour, with  
a flame 3 inches long, and giving a light  
equal to 16 sperm candles, being exactly  
equal to the Parliamentary standard. By  
this means the following results were ob-  
tained, after a number of preliminary ex-  
periments had been made to insure ac-  
curacy:

1. The naked light (mean of 8 ex- periments).....	=378.1 candles
2. The light within an opal globe (mean of 3 experiments).....	=154.9 "
3. The light within a frosted globe (mean of 2 experiments).....	=265.0 "

So that the opal glass reduced the amount  
of lighting 59 per cent. and the frosted  
globes 29.9 per cent.

To obtain the best comparison with gas,  
experiments were conducted with some of  
Sugg's large-sized burners. To produce a  
light with them equivalent to 155 candles,  
the consumption of gas equaled 48 cubic  
feet an hour, and for a 264-candle light the  
consumption was raised to 83 feet.  
The cost of the electric light was figured  
out from these experiments to be almost  
double that of gas. While this relation  
would certainly not be the same in this  
country, as the various items of cost differ  
considerably, the general result would  
probably be similarly in favor of an im-  
proved method of burning gas, such as that  
obtained through the use of Sugg burn-  
ers, compared with an electric light  
as efficient as the Jablochhoff. It should  
be taken into consideration, also, that  
in the above experiments the light from  
the electric candles was superior to that  
of gas, and that much of its effect was  
lost by an absence of reflectors. It is thought  
that considerable economies can still be ef-  
fected with the electric light, and this an  
experiment with 40 candles, to be made in  
London, will test. But it is doubtful  
whether even then the cost will sink to fig-  
ures which will be considered an equivalent  
for the better quality of the light. The ex-  
periments, however, are of value to engi-  
neers in this country, as they furnish data  
for the estimation of the Jablochhoff light,  
the one which has until now undergone the  
longest and most searching tests.





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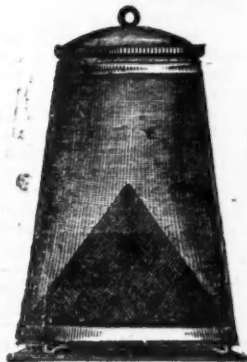
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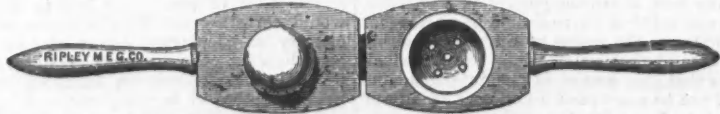
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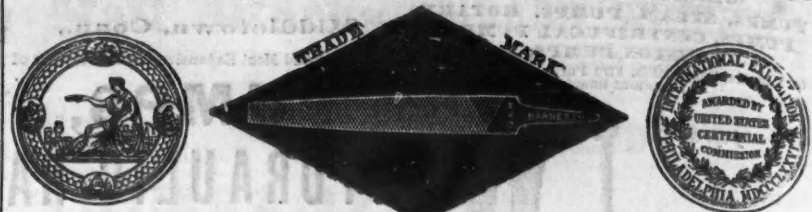
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**G. & H. BARNETT,**

39, 41 & 43 Richmond St., Philadelphia.

**CHARLES B. PAUL,**  
Manufacturer of HAND CUT FILES.

Warranted **CASE FILES.** 187 Tenth Street, Williamsburgh, New York. Established 1863.

**THE STANLEY WORKS,**  
MANUFACTURERS OF  
**Wrought Iron Butts, Hinges**

AND  
**DOOR BOLTS,**

Plain, Japanned, Bronzed and Plated.

We are prepared to furnish all kinds of

**WROUGHT IRON BUTTS,** both Common and Bright Finish.

**FACTORIES:**

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New Britain, Connecticut.

79 Chambers St., New York.

**SABIN MFG. CO.,**

MONTPELIER, VT., Manufacturers of

**PATENT DOUBLE ACTING SPRING BUTTS,**

**Sabin's Lever Door Springs**

For Heavy Doors.

The **BOSS** and **CROWN SPRINGS** for Screen and Light Inside Doors.

General Agents. **HENRY BROOKS & CO.,** 127 Milk Street, Boston.  
**E. P. WHIPPLE,** 100 Chambers Street, New York.  
**KELLOGG, JOHNSON & BLISS,** 108 Randolph Street, Chicago.

**GRAHAM & HAINES,**

P. O. Box 1040. 113 Chambers and 95 Reade Streets, New York.

**HARDWARE MANUFACTURERS' AGENTS, as follows:**

**Lawrence Curry Comb Co.,** Hinges and Wrought Butts.  
**Howard Bros. & Co.,** Cotton, Wool and Curry Cards.  
**Thompson, Derby & Co.,** Scythe Snaths.  
**Ostege Fork Mills,** Steel Forks, Rakes, Hoes, &c.  
**H. Knickerbocker,** Scythes, Axes and Tools.  
**H. W. Kipp, Nail Hammers.**  
**Kloman, Park & Co.,** Vises.  
**Picks, Mattocks, Grub Hoes, &c.**  
**Jacobus & Nimick Mfg. Co.,** Locks, &c.  
**Sandusky Tool Co.,** Planes and Planes.  
**Geo. M. Eddy & Co.,** Measuring Tapes.  
**Wheeling Hinge Co.,** Hinges and Wrought Butts.  
**Northwestern Horse Nail Co.,** Horse Nails.  
**A. G. Coes & Co.,** Coes' Genuine Screw Wrenches.  
**F. K. Silby, Emery Cloth.**  
**Holroyd & Co.,** Stocks and Dies.  
**Sedgwick Mfg. Co.,** Butter and Flour Trays, etc.  
**Ripley Mfg. Co.,** Mouse Traps.  
**Sam'l Loring,** Plymouth Tack & Rivet Works.  
**Carr, Crawley & Derrin,** Miscellaneous Hardware & Cast Butts.  
**J. Mallinson,** Cast Steel Shears and Scissors.  
**Ketchum's Pat. Metallic Sieves.**  
**W. D. Turner & Co.,** General Hand Fluters.  
**D. B. Niles & Son,** Hand and Sleigh Belts.  
**C. S. Osborne & Co.,** Com-passes, Calipers, Dividers, &c.  
**C. W. Maguire, Brushes.**  
**Clark Bros. & Co.,** Carriage Bolts, &c.  
**Lowrey & Tucker,** the Genuine Knox Fluting Machine.  
**T. B. Barclay,** "Dodge's" Kentucky Cow Bells.  
**Lane Bros.,** Swifts and Grocers' Coffee Mills and Measuring Pans, &c.  
**T. C. Richards Hardware Co.,** Bright Wire Goods, Picture Nails, &c.



**Earnshaw's Patent Flour Sifter** (which we control and grant Licenses) covers all sifting devices combined with a Flour or Meal Scoop. This claim has been sustained in the United States Circuit Court, District of Mass., Northern District of New York and Eastern District of Michigan.

**NATIONAL MANUFACTURING CO.,** - 83 & 85 North Street, Boston.

New York Salesroom, 151 Williams Street.

**THE AMERICAN MACHINE CO.,**

Manufacturers of

# HARDWARE SPECIALTIES.

Office and Factory:

No. 1916 to 1924 North 4th St., Philadelphia.

Branch House:

No. 128 Chambers St., New York.

**SPECIALTIES:** Fluting Machines, Hand Fluters, Planing Machines, Christmas Tree Holders, Blockford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, &c., &c.



**LAKE SUPERIOR PAINT CO.,**

Manufacturers of

**Extra Fine Iron Ore Paint,**

CLEVELAND, OHIO.

Trade Mark Patented.

P. O. address, Box 69.

# TACKS, NAILS & RIVETS.

Lining and Saddle Nails, Coffin Tacks and Tufting Buttons.

New York Salesroom, 116 Chambers Street.

**AMERICAN TACK CO.,** Fairhaven, Mass.



# A. FIELD & SONS,

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH

## WIRE NAILS,

TACKS, SHOE NAILS,

And Every Variety of Small Nails.

Offices & Factories at Taunton, Mass.

Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above-named goods made from sample to order.

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.

**Hoisting Machinery**  
MANUFACTURED BY  
**CRANE BROTHERS MFG. CO.,**  
Chicago.

### PRIZE MEDALLISTS:

London, 1862; Oporto, 1865; Dublin, 1865; Paris, 1867; Moscow, 1872; Vienna, 1873; and Philadelphia, 1876.

**CLARK & CO.,**

Original Inventors and Sole Patentees of

Noiseless Self-Coiling Revolving  
**STEEL SHUTTERS,**

FIRE AND BURGLAR PROOF.  
ALSO IMPROVED

**Rolling Wood Shutters**

Of various kinds. Endorsed by the Leading Architects of the world.  
Send for Catalogue.

Office and Manufactory,

162 & 164 West 27th St., N. Y.

**AMERICAN DOUBLE-ACTING HORSE WAGON.**  
Patented April 5, 1879.  
Warranted the Best and Cheapest in the World.  
Catalogue and price list of new Hardware articles upon application.  
**Philadelphia Novelty Manufacturing Co.,**  
822 Cherry Street, Philadelphia, Pa.

**CLOTHES WRINGERS.**



**T. J. ALEXANDER, Manager,**  
BOSTON, MASS.

**THE IMPROVED Double-Action Hydronette Pump**

is an invaluable implement for sprinkling flowers, &c. It is made in a very durable manner, handsomely nickel plated, and cannot easily get out of order. Also makers of Brass Greenhouse Syringes, fine mandrel-drawn Brass Tubes of all sizes and thickness. Tubes for sliding one within the other made to order. Send for circulars, &c.

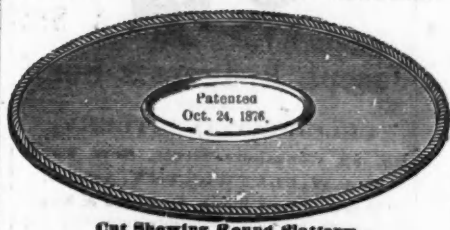
**ROBERT T. DEAKIN & CO.,**  
12th and Buttonwood Sts., Philadelphia.

### ANSONIA CORRUGATED STOVE PLATFORM

Manufactured by the

**Ansonia Brass & Copper Co.**

Office, 19 & 21 Old Street,  
NEW YORK.



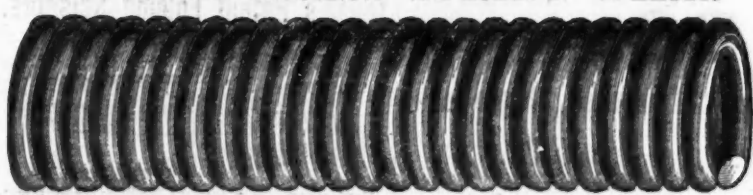
Out Showing Round Platform.

Section Showing Edge.

The Ansonia Corrugated Stove Platform, with its heavy figured ogee border, is believed to be the best Platform offered to the trade. As shown in the illustrated section herewith it requires no nailing to keep it in place or to prevent it from turning up at the edge; while the metal is of sufficient thickness to require no lining.

The low price, superior quality and fine finish of this Platform will be readily acknowledged. Packed 24 in a case. Send for price list.

### ANSONIA BRASS SPRING WIRE.



The Ansonia Brass Spring Wire is made to combine the qualities of uniformity of temper, great power of resistance and recovery, toughness and accuracy of gauge. Each bundle of wire, before it leaves the works, is subjected to test in a machine which records the deflection and molecular displacement under transverse stress and torsion, and is especially adapted to making spiral springs for moving and reaping machines, harvesters and for all purposes for which the highest grade of spring wire is required.

We do not make Springs.

### NEW YORK BELTING AND PACKING COMPANY.

The oldest and largest manufacturers in the United States of

### Vulcanized Rubber Fabrics

In Every Form, Adapted to Mechanical Purposes.

MACHINE BELTING with smooth metallic rubber surface.  
STEAM PACKING in every form and variety.  
LEADING AND SECTION ROPE, of any size or strength.  
"TEST" ROPE.—This extra quality of Rubber Hose is made expressly for steam fire engine use, and will stand a pressure of 300 lbs. per square inch.

CABLE ANTISEPTIC COTTON ROPE. Patented July 8, 1873. This is a rubber-lined, extra heavy Cotton Rope, woven seamless in a peculiar manner, to insure compactness and durability. The rope weighs 10 lbs. to the section, and has been tested to 20 lbs. It is the lightest and most durable seamless Cotton Rope in the market. For use on Hand or Steam Fire Engines.  
ANTISEPTIC LINEN AND RUBBER-LINED LINEN ROPE. A cheap and durable article for mining, mill and factory purposes. Will stand a pressure of 300 lbs. per square inch.

CAUTION.—Our name is stamped in full on all our best Standard Belting, Packing and Hose. Buy that only. The best is the cheapest.

WAREHOUSE, 37 and 38 Park Row, New York.

**JOHN H. CHEEVER, Treasurer.**

Price lists and further information may be obtained by mail or otherwise on application.



**Beardsley Scythe Co.,**  
Manufacturers of  
GRASS, GRAIN & BUSH SCYTHES,  
Hay Knives & Corn Knives.  
West Winsted, Conn.

See our advertisement in The Iron Age first issue of each month.

### RICHARD DUDGEON,

No. 24 Columbia Street, New York,

Maker and Patentee of the Improved

**Hydraulic Jacks**

AND  
**Punches.**



Roller Tube Expanders and Direct Acting Steam Hammers.

Communications by letter will receive prompt attention.  
Jacks for pressing on Car Wheels or Crank Pins made to order.

### INDUSTRIAL ITEMS.

#### NEW HAMPSHIRE.

The government has awarded a contract for 300 dozen axes to the Underhill Edge Tool Company, of Nashua, and an order for locks to the Nashua Lock Company.

The Moulton and Ranlet Car Manufacturing Company, of Laconia, are making six cars for the Pacific and Franconia Notch Railroad. These cars are expected to go on the road the 20th of June. Two cars are also in process of manufacture for the Whitefield and Jefferson Railroad, which is to open for passenger travel about July 1.

#### VERMONT.

The Lane Manufacturing Company, of Montpelier, have for some months past been running a quarter day extra time and employ about 50 hands. Water wheels and all kinds of woodworking machinery are turned out at this establishment.

#### MASSACHUSETTS.

The Boston Lead Company are running full time on their specialties, which include lead pipe, sheet lead, a superior quality of pure white lead, red lead and litharge. This company are the exclusive New England manufacturers of patent tin-lined pipe.

The Fitchburg Steam Engine Company of Fitchburg, have just filled two orders for looms for weaving wide elastic or shoe goring, and are now shipping a large order for making suspender webbing. This company's loom is an independent shuttle loom.

The Hinkley Locomotive Works, of Boston, have just shipped a narrow-gauge locomotive to the Pacific and Franconia Notch Railroad.

#### CONNECTICUT.

The Meriden Malleable Iron Company will build an addition to their factory, 60 by 40 feet.

The Westford Gold and Silver Mining Company own a ledge in the northerly part of Westford, and will soon begin working it for gold. They have a capital of \$50,000. Assays encourage the belief that gold can be found in paying quantities.

#### NEW JERSEY.

The Bishop & Palmer Mfg. Co., of Newark, are introducing a very attractive line of harness trimmings made of a new alloy, manufactured by the Powell Silver Metal Company of that city. It is a strong, tough metal of excellent color, and does not require plating. It is claimed that it will not discolor nor tarnish in use, and cannot wear out. The Powell Silver Metal is an alloy which promises to possess great utility in the arts, and is likely to replace metals requiring to be plated with silver or nickel for many uses connected with hardware manufacture.

#### PENNSYLVANIA.

Too late for insertion in our last week's issue we received notice to the effect that an accident occurred at the Rome Merchant Iron Mill, on the 11th instant, caused by the bursting of the cylinder of the main engine. This necessitated a stoppage of uncertain duration. We shall notify the trade when repairs are completed and operations resumed.

The Moselem Furnace, at Moselem, Berks County, owned by Leibbrandt & McDowell, has just blown in.

The Bingen Furnace, at Bingen, Northampton County, recently purchased by the Bethlehem Iron Company, has been put in blast.

"Tubal Cain," in the Sharon Herald of the 13th inst., says for the week ending June 7: In Sharon, at the Westerman Iron Co.'s mill, repairing everything, making a thorough renovation from top to bottom. Kimberly, Carnes & Co., Atlantic, went on double turn in nearly all departments on Monday of present week. Mr. Peter Kimberly having signed the scale on Saturday. Keel Ridge blast furnace working up to its average. Stewart Furnace No. 2 is averaging close to 50 tons a day Bessemer. The Globe Works, Cleveland, Ohio, have got the contract for making the new steam boilers in Sharpsville, all three of the furnaces doing well. The hearth and boshes were finished at the Ormsby Furnace last week. Last week and this one will be needed to make the necessary repairs on the rolling mill at Middlesex. Mr. Wheeler had not signed the scale up to Tuesday evening, but it is understood that he will sign it, as orders have been given for all the employees to be at their places on Monday morning, the 16th inst. With the thorough repairs which have been put on all the machinery, we anticipate a steady run from now well into the winter months. Fanny Furnace will go out on Thursday. A double force of men will be put on getting the remainder of Kimberly & Carnes' works, which makes everything in the Shenango Valley the same as it was before the 1st of June, with the chances of improvement in the ascendant.

The Pennsylvania Railroad Company are about to put down artesian wells at Altoona—one at the upper, and one at the lower, shops. The derrick and implements for boring the one in the yard of the upper shops are already on the ground.

The Reading Rolling mills of the Philadelphia and Reading Coal and Iron Co. are running full. They make on an average about 500 tons of rails per week.

The property known as the Old National Iron Co., Danville, was sold at a trustee sale on the first mortgage bonds on Saturday, the 7th inst., to A. Creveling, for \$30,000. The works will now be operated by A. Creveling & Co.

The Gautier Steel Company, Limited, of Johnstown, are building an additional span to their rolling mill, 160 feet long by 65 wide, in which will be put several double presses for shearing plow plates, and a 2500 and 3500-pound steam hammer. They have just finished a stock shed for keeping a stock of blooms and breaking up steel for rolling, covering 12,000 square feet, which will make the total area covered by their buildings about five acres.

Of the three anthracite furnaces of the Messrs. Brooke, at Birdsboro, one known as No. 2 is now in blast, and has been working successfully for some time. The new furnace No. 3, on the main line of the Reading road, east of the Schuylkill, is in course of preparation, and will be fired up probably this week, and commence the

manufacture of Bessemer iron by the Bessemer process. This furnace, recently built, is provided with all the latest improvements, and is probably one of the finest furnaces in the State. As soon as No. 3 is fairly in blast, work will be commenced to put the old No. 1 furnace, on the canal, in working order, and it, too, will be ready to go in blast in the summer or early fall.

The Travis self-adjusting railway cross tie has been placed on the Philadelphia, Wilmington and Baltimore Railway, having after a severe test proved a success on the Baltimore Central. The ties are being manufactured by the Wharton Switch Company, of Philadelphia, and there is little doubt that they will soon be in use on many leading roads. We understand that the Lehigh Valley Railway Company have made arrangements to place them on their roads immediately.

The town of West Chester, Chester County, is rapidly gaining industrial importance.

Hoopes, Brother & Darlington have a large spoke and wheel factory, which gives employment to over 100 hands. They export their goods to several foreign ports. Broomall, Miles & Co. run a flouring mill in connection with a machine shop, and do repairing and general jobbing. The old machine shop formerly owned by Evans & Baird, was bought at sheriff's sale by Mrs. Mary B. Biddle, and is now running under the management of Thomas Baird, of the original firm. The foundry stands idle for want of work. The new machine shop and foundry of John Evans, son of the elder Evans, of the late firm of Evans & Baird, is a two-story brick building, 33x110 feet. The machine shops are fitted with the latest improvements in the way of tools, and the cupola is provided with Evans' improved tuyeres, which are claimed to distribute the blast very perfectly. These shops are very busy, working part of their force 13 hours a day. They have just put up a steam saw mill, and have on hand orders for iron fences, farm machinery, school furniture and a variety of repairs, with prospects of a good trade in engines, &c. At the sheriff's sale of Evans & Baird's works, Mr. Evans purchased their entire stock of patterns and special tools.

#### PITTSBURGH AND VICINITY.

Adams & Co. have added a new furnace to their glass works, and are putting new pots in one of the old ones.

The proprietors of the Crescent Steel Works have not yet signed the scale, and the puddling department, four furnaces, is still idle. All other parts of the works are running double turn.

Contractor Hartup will very likely bring suit against the city immediately for \$225,000 worth of worthless water works.

There is not a nail machine running in Pittsburgh, and the prospect for resuming operations is very unfavorable. Zug & Co. have not turned a wheel in their nail factory since July, 1878. Shoenberger & Co. are reported as about to change their factory into a wire mill. Chess, Smythe & Co. will not run until there is some profit in the business. Jones & Laughlin and Graff, Bennett & Co. have run but little lately, and will run still less unless prices improve.

Challinor, Hogan & Co., lamp chimney manufacturers, will resume on the 7th of July, and continue to use the patent crimper as they did in Chicago.

Freight rates to Chicago from Pittsburgh have been restored to 15 cents by the railroad and 20 cents for less than car-loads. These were the rates agreed upon May 15th, the day before the war began. That war will always be memorable as the first by which Pittsburgh shippers gained any advantages—all due to having a new outlet.

Dithridge & Co., Limited, South Side, are running their factory with ten shops.

The Fort Pitt Glass Works are shut down for repairs.

The Excelsior Glass Works, this city, will shut down for several weeks.

Bakewell's Glass Works, South Side, are running full time.

The window glass manufacturing establishment of Messrs. Abel, Kim & Co., on the South Side, which early in the season was only partially in operation, is now in full blast, as it has been for more than a month past.

The window-glass houses of Pittsburgh are all running full time now, full handed, and with good prospects.

Atterbury & Co.'s glass works, South Side, are running steady, full handed.

The O'Hara Glass Works, Pittsburgh, are running steady, with bright prospects.

The Beaver Falls Co-operative Glass Company are about ready to go to work. They set pots some days ago.

The bottle and prescription glassware factories of this county are all running full time, with good prospects.

F. L. Shirley, of New Bedford, Mass., filed a bill in the United States Circuit Court against the Dithridge Lamp Chimney Company, Limited, alleging that they have infringed upon a patent device belonging to him, and known as a lamp chimney crimper. This is the machine whose introduction caused the long strike in this trade.

The old Superior Rail Mill has five heating furnaces working in the rail mill department, making street car rails from old steel rails.

Out of 29 glass factories on the south side but four are idle at present.

The Glenwood Steel Works, open-hearth, are idle, making changes in their method of casting. The ingots made here have been cast from the top, and of the usual square form. The demand is mainly for a flat ingot—a slab really. To produce these satisfactorily will require bottom casting. When arrangements are completed for this the works will resume.

Four open-hearth steel furnaces are at work in Pittsburgh. A year ago there was only one. The fifth is nearly ready to start. The sixth and seventh are reported under contract, and arrangements are about completed to begin the building of two others.

Preparations are being actively made to start up Lindsay's Glass Works, a number of glass workers having taken a certain amount of stock in the same.

#### MARYLAND.

The Antietam Mill, Washington County, Md., will begin operations in a few days.



## Cutlery.

# FRIEDMANN & LAUTERJUNG,

Manufacturers of  
PEN AND POCKET CUTLERY,  
Solid Steel Scissors, Shears, Razors, &c.  
Sole proprietors of the renowned full concave patent  
"ELECTRIC RAZORS,"  
And the "ELECTRIC SHEARS." Nickel Plated  
Saws.  
Agents for the BENGAL RAZORS.  
AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.  
91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

### MERIDEN CUTLERY COMPANY.

"THE PATENT IVORY" HANDLE TABLE KNIFE.

It is oldest manufacturer of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE, BUTCHER AND HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application. No. 49 Chambers Street, New York.

THE  
**LAMSON & GOODNOW**  
88  
CHAMBERS ST.  
MFG. CO. N.Y.  
AMERICAN TABLE  
CUTLERY & C.

AARON BURKINSHAW,  
Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass.  
My Blades are forged by hand from the best Cast Steel, and warrant-  
ed. To me was awarded the Gold Medal of the Conn. State Agricultural Society.  
Office in New York with E. P. Whipple, 100 Chambers St.

**NAUGATUCK CUTLERY CO.,**  
Manufacturers of FINE PEN & POCKET CUTLERY.  
FULLER BROS., Sole Agents, 89 Chambers and 71 Reade Sts., N. Y.

## HALL, ELTON & CO.,

Electro Plated Ware, German Silver and Britannia Spoons.



Factories, Wallingford, Conn.

Salesroom, 75 Chambers Street, New York.

**STANLEY RULE AND LEVEL CO.,**

Improved  
Carpenters'  
Tools.



Factories,  
New Britain, Conn.  
Warehouses,  
29 Chambers St.,  
New York.

No. 113, Improved Adjustable Circular Plane - \$4.00

## PAYSON & CO.,

MANUFACTURERS OF

## BUILDERS' HARDWARE.

### SPECIALTIES:

Perfect Sash Locks,  
Horizontal Blind Hinges,  
Shutter Bars and Knobs.  
Hinged, Flush and Common Sash Lifts,  
Universal Sash Holders,  
Door Jamb Bolts,  
Flue Joist Shoes,  
Positive Drop Latches.  
Direct Lever Door Knobs and Latches.

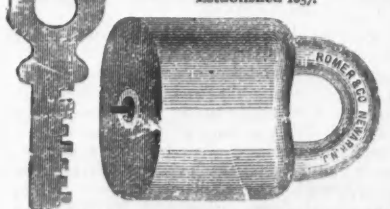
### OFFICE AND FACTORY:

1319 to 1325 West Jackson Street,  
CHICAGO.

### AGENTS:

St. Louis, CHAS. HUMES & CO.  
Baltimore, SAM'L G. B. COOK & CO.  
New York, FERNALD & SISE,  
Boston, A. T. YOUNG.  
Rochester, N. Y., HAMILTON & MATHEWS.

**Romer & Co.**  
Established 1837.



Manufacturers of Patent Scandinavian or Jail  
Locks, Brass Pad Locks for Railroads and Switches.  
Also Patent Stationary R. R. Car Door Locks. Pat-  
ent Piano and Sewing Machine Locks.  
141 to 143, Railroad Avenue, NEWARK, N. J.  
Illustrated Catalogue sent to the trade on ap-  
plication.

**GEORGE W. BRUCE,**  
1 Platt St., New York,

Agent for CLEMENT & MAYNARD'S Trowels, Hoe's,  
Shovels, Spades and Scoops. Their Trowels and Hoes  
have entirely supplanted the English by their quality  
and cheapness, while all their goods compare advan-  
tageously with those of other makers and are largely  
exported.

## MACHINE MOULDED MILL GEARING.

AS ACCURATE AS CUT GEARING.

AND MORE DURABLE IN USE.

Saves Time and Expensive Patterns.

SHAFTING, PULLEYS AND HANGERS.

A SPECIALTY.

LEFFEL TURBINE WATER WHEELS.

STEAM ENGINES AND BOILERS.

MIXERS FOR FERTILIZERS AND CHEMICALS.

POOLE & HUNT Baltimore.

**John Carver,**

MANUFACTURER OF

## CAULKING IRONS,

Cotton, Freight and Hay Hooks,

No. 288 Monroe Street,

Bet. Jackson & Corleone Sts., NEW YORK.

## Cutlery.

### HAVE YOUR HAIR CUT.



## Clark's Hair Clipper.

Extensively used and the only reliable machine  
for close clipping.  
Simple in operation and finishes the work in  
short time.

**MCCOY & CO.,**

Sole Agents,

132 Duane Street, New York.

Silver Medal, 1878-Paris.



**J. R. SPENCER & SON,**  
Albion Steel Works, Sheffield,

MANUFACTURERS OF

## FILES

AND  
**STEEL,**  
Table Knives, Razors, Shovels, &c., &c.,  
of every description.

CORPORATE MARK.

**SPENCER**  
SHEFFIELD

Granted 1749.

## Cutlery.

## JOSEPH S. FISHER,

No. 411 Commerce St., PHILADELPHIA

AGENT FOR

George Wostenholm & Son,

"Limited."

Washington Works, SHEFFIELD,

Celebrated I-XL Cutlery, Razors, &c.

AGENT FOR

WALTER SPENCER & CO.,

Steel and File Manufacturers,

Rotherham, ENGLAND.

CORPORATE MARK.

**SPENCER**

ROTHERHAM

Granted 1777.

ALFRED H. HILDICK,

19 Warren St., N. Y.

Importer of CHAINS, ANVILS, VISES, &c.

Agency of

HILL BROTHERS & CO., WALSHALL, ENGLAND

GENERAL HARDWARE MERCHANTS,

And of

BALL'S PAT. SOLID STEEL SHEEP SHEARS.

These shears are unsurpassed for cheapness, dura-

bility and utility. They are made of one solid piece

of steel from point to point, and cannot be broken in

use either in the bow or at the junction of the shank

and blade. Samples can be seen at above address, or

sample lots furnished.

CORPORATE MARK.

**Joseph Rodgers & Sons'**

(LIMITED)

CELEBRATED CUTLERY,

No. 83 Chambers Street, New York.

F. & W. CLATWORTHY, Agents.

The demand for Joseph Rodgers & Sons' pro-

ductions having considerably increased, they

have, in order to meet it, greatly extended their

Manufacturing Premises and Steam power.

To distinguish Articles of Joseph Rodgers &

Sons' Manufacture, please to see that they bear

their Corporate Mark.

Young's Patent Folding Scissors.



HAVING largely increased our facilities for the manu-

facture of these very popular goods, we offer them to

the trade at a large reduction from our former

prices. The list price of the large size is now \$12.00

per dozen, formerly \$15.00, and the small size, \$9.00,

formerly \$12.00. The material used in the manu-

facture of Young's Patent Folding Scissors is the

very best. All are nickel-plated and furnished with

a neat Morocco case.

**MARX BROS., Proprietors,**

430 Broadway, New York.

Established in 1839.

**A. G. COES & CO.**

WORCESTER,

MASS.,

Successors to

L. & A. G. Coes,

Manufacturers of

THE GENUINE

COES

Screw

Wrenches.

PATENTED,

May 2, 1871.

December 26, 1871.

December 28, 1875

August 1, 1876.

The back strain when the wrench is used is borne

by the bar—not by the handle.

The strongest Wrench made, and the only suc-

cessful Re-enforced Bar.

None genuine unless stamped

**A. G. COES & CO.,**

Our Agents, GRAHAM & HAINES, 113 Chambers St.,

New York, carry a full line of our goods, and will be

pleased to serve you at factory prices.

P. O. Box 362.

ESTABLISHED 1836.

**Alfred Field & Co.,**

COMMISSION MERCHANTS,

New York, Birmingham, Sheffield, Liverpool.

Guns and Pocket Cutlery,

SPECIALTIES.

Headquarters for

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CHESTERMAN'S TAPES,

GERMAN COIL AND HALTERS and other CHAINS.

BRADY'S TROWELS AND HOES,

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All sorts of Hardware and Merchandise for im-

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GLOSSING AND FLUTING IRON.

With Brass or Nickel Flutes. Prices furnished

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TRY

**GOODMAN'S**

New American Chemically Prepared

**Felt Gun Wads.**

Superior in quality to English Wads.

For sale by all dealers. Manufactured by

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**CHAS. E. LITTLE, 59 Fulton St., N. Y.**

1760.

Solid Cast Steel Augers & Reamers

For Boring PUMP LOGS. All sizes in stock

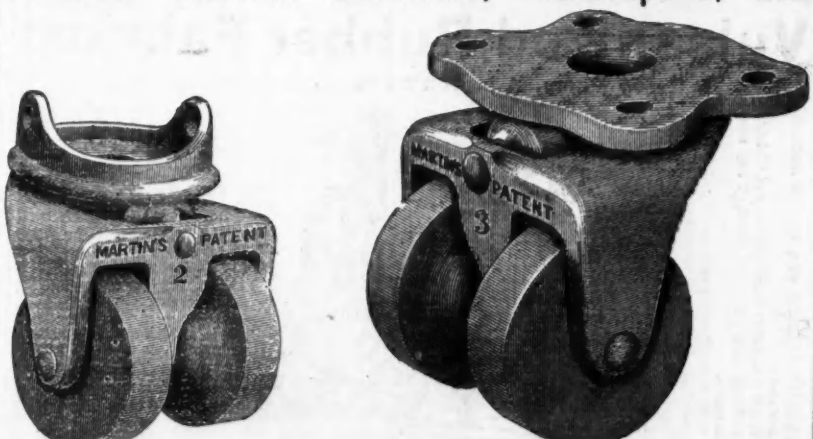
Socket Shank, Rim Handles, and Connecting

Rods for the above to order. Also Trenching Tools

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Our different sizes of Casters are adapted for use as designated below.

No. 1. For parlor chairs and other very light furniture.

No. 2. For invalid and office chairs, extension and other light tables, rope reels, flower stands, &c.

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No. 4. For heavy bedsteads, book cases, flower stands, refrigerators, safes, sideboards, desks or very heavy furniture.

No. 5. For pianos extra heavy sideboards and bookcases.

No. 6. For show cases, light store trucks, ice chests, heavy refrigerators, heavy flower stands, &c. Es-

pecially useful as a truck under sample stoves or any heavy sample goods.

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tors, or any very heavy weight. Especially adapted for use in beer bottling, fruit canning, tobacco or ware-

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Manufactured by Tucker Alarm Ttl Manuf'g Co. Indianapolis, Ind.

October 1st 1878.

**Adjustable**

**STOVE TRUCK.**

Send for Illustrated Catalogue.

**TUCKER & DORSEY,**

Manufacturers of Tucker's Incomparable Adjustable Stove Trucks and Tucker's

Alarm Money Drawer, Indianapolis, Ind.

Simple, Cheap, Light, 1

2

Durable, short hitch, adapted to strength of Horse.

Frederick's 3-Horse Equalizer is a perfect Double Tree, a perfect Tripple Tree, a perfect 2-Horse

Stretcher, a perfect 3-Horse Stretcher, a perfect attachment for either 2 or 3 horses anywhere.

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# THE WM. ROGERS MANUFACTURING COMPANY AND THE ROGERS CUTLERY COMPANY, MANUFACTURERS OF Cutlery and Silver Plated Table Ware.

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Established 1871. On Spoons, &c. 1871 ROGERS & 5 oz. Established 1865. WM. ROGERS & SON, AA.

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Our Knives are guaranteed  
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All our goods are put up  
ONE DOZEN IN A BOX.

Our SPOONS, FORKS, &c., are guaranteed  
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On Tea Spoons..... 48 dwts. per gross  
On Dessert Spoons and Forks.... 72 dwts. per gross  
On Table Spoons and Med. Forks. 96 dwts. per gross  
ALL OTHER GOODS IN PROPORTION.

All our SPOONS, FORKS, &c., are  
guaranteed to be plated upon  
18 per cent. Nickel Silver,  
the best known base for plating  
upon.

OUR GOODS ARE PLATED 20 PER CENT. ABOVE STANDARD PLATE.

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WM. H. WATROUS, President.  
F. WILLSON ROGERS, Secretary.

Drawer 30, Hartford, Conn.

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AMERICAN SCREW CO.'S Screws.  
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FRANCE'S Shutter Holders.  
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PLYMOUTH MILL CO.'S Black and Tinned Iron Rivets.  
AMERICAN MACHINE CO.'S Fluters, &c.  
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HUSSEY, HOWE & CO.'S Bar & Sheet Cast Steel.

Also a large line of Heavy and Shelf Hardware.

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Office, No 161 FRANKLIN ST., BOSTON,  
Manufacturers of  
Specialties in House Furnishing Hardware,  
PATENT EXTENSION DOOR KNOBS

(Pat. Jan. 29, 1878)  
manufactured in  
every variety of  
style. Silver-Glass,  
Silver Center, Fine  
Cut, &c. Fitted with  
heavy silver-plated  
mountings. Extend  
from 1 to 3 inches.  
They can be adjust-  
ed to doors of any  
thickness without  
the annoyance of  
the old-fashioned  
washers and pins.  
Our "Patent Cham-  
ber" (Pat. Nov. 6,  
1877) prevents all  
possibility of the  
bursting of the glass  
bulbs.  
A trial will make  
plain their merits.  
Send for illustrated  
price lists and circulars.



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## ALWAYS ASK FOR ESTERBROOK'S Steel Pens.

THE MOST POPULAR PENS IN USE.  
For Sale by all Stationers.

ESTERBROOK STEEL PEN CO.,  
Works, Camden, N. J. New York.

PATENT "SCREW WINDOW BALANCES,"

A Mechanical Substitute for Sash Weights.  
Roller Controlled by an Adjusting Screw.  
FOR MEDIUM AND LIGHT SASHES.

Retail Price, \$1.00 per Window (4 Balances).  
Balance the Sash at any point; no handling in  
working the sash; sashes work freely and power  
is reserve instantly available by drawing the pat-  
ented "Adjusting Screw" if required, without re-  
moving sash. The tires of rollers are a compound of  
rubber and fiber; made without spring; are unaf-  
fected by weather; have four inches of wearing sur-  
face; wear round; do not mar the window; have  
great durability; and with the patented "Clamp"  
the Sash does not sag after raising, or bind while relas-  
ing, or get out of working order; saving patience, money  
and time in repairs, &c.

ADVANTAGES.—As readily applied as a Sash  
Pulley; simple and substantial in construction, do-  
ing all claimed for them. They fill a place in Build-  
ers' Hardware, rendering boxed frames, weights,  
cords, pulleys, &c., unnecessary to obtain fine work-  
ing windows. The Sashes are both locked, as with  
weights, by one operation. Have been in use one  
year, giving entire satisfaction. Approved by re-  
newed orders from firms dealing in them, &c.

For Sale by the Hardware Trade.  
ROBT. B. HUGUNIN,  
Manufacturer "Screw Window Balances,"  
Wethersfield, Conn.



PHOSPHOR-BRONZE

Bearings, Pump Rods and Spring Wire.

Phosphor-Bronze. Apply to  
The Phosphor-Bronze Smelting Co., Limited,  
208 Washington Avenue, Philadelphia.

OHIO.  
Messrs. Ooms, Adams & Co.'s Machine  
Works, Findlay, are quite full of orders,  
and find plenty of work for 19 or 20 hands.  
Lawrence Mill, Ironton, is running its fin-  
ishing department double turn.

The Steubenville Furnace and Iron Com-  
pany, we are glad to learn, is in a very pros-  
perous condition under the present manage-  
ment. They have taken advantage of the  
low rates on railroads and shipped all the  
iron they have manufactured, having sold it  
to good advantage. There are, besides, 300  
tons which they have yet to make.—Steuben-  
ville Gazette.

The Furnace Company is rapidly gather-  
ing in stock, preparatory to going into blast.  
They have a good lot of native roasted  
ore, and are buying daily from our farmers.  
About 70 car-loads of Lake Superior ore  
have been received within the past ten days,  
as well as large quantities of coal and lime-  
stone. Nearly everything is in readiness.  
The great engine was started up for trial a  
day or two ago, and worked like a thing of  
life.—Iron Valley (Canal Dover) Reporter.

The Cleveland Rolling Mill Company has  
an order for 6000 tons of steel rails for the  
Northern Pacific Railroad; also a contract  
for 2500 tons of iron rails to be delivered in  
May and June.

The National Glass Works Bellaire, are  
still busy on chimneys and pressed work.

The Acme Glass Works, at Steubenville,  
have 72 shops employed, working half time  
at present. They propose to start their  
other furnace about the 1st of July, when  
they will add 20 more shops, and increase  
the time from one-half, their present rate,  
to two-thirds or full time. They shipped  
1900 boxes of their ware in one week re-  
cently, and would have done even better  
than this but for the low water.

ILLINOIS.  
Bullock, at his shops, Chicago, is making  
three of his No. 1 prospecting diamond  
drills, for the Menominee, Cleveland and  
Lake Superior iron companies, respectively,  
and one of his Little Champion machines,  
for the Saginaw Mining Co.

MICHIGAN.  
No. 2 stack of the Pioneer Furnace was  
to have been ready to be blown in the middle  
of last week.

The following from the Marquette Mining  
Journal, is a statement of ore and pig iron  
shipments from Lake Superior, by lake, for  
the season of 1879, up to and including  
Wednesday, June 4, in gross tons:

MARQUETTE.	
Cleveland.....	751
Lake Superior.....	9,721
Humboldt.....	9,465
Edwards.....	1,203
Republic.....	2,625
Champion.....	12,367
Marquette.....	10,387
Total from Marquette.....	53
PIG IRON.	
Carp Furnace.....	45,302
Pioneer Furnace.....	1,630
Total pig iron.....	540
QUARTZ.	
Carp River Iron Co.....	2,190
L'ANSE.	
Michigan.....	4,414
Spout.....	408
Total from L'Anse.....	4,822
Ore to local points.....	10,028
Total ore, pig iron and quartz.....	73,560
ESCANABA.	
Angeline, Specular.....	3,790
Angeline, Hematite.....	753
Barnum.....	4,996
Bascom.....	370
Cambria.....	745
Cheshire.....	3,113
Cleveland.....	1,449
Cleveland Hematite.....	2,777
Cyclops.....	3,460
Edwards.....	392
Emmett.....	3,201
Goodrich.....	301
Jackson.....	8,161
S. Jackson.....	3,298
McComb.....	1,722
Michigan.....	5,433
Mitchell.....	1,474
National.....	4,624
Saginaw.....	8,542
Salsbury.....	5,539
Palmer.....	4,493
Quinn.....	4,624
Saginaw.....	4,604
Salsbury.....	5,563
Superior, Hematite.....	5,959
Vulcan.....	589
Total.....	93,906

### The Locomotive Building Interest.

More locomotives are building at present  
than at any time since 1873. This we hear  
affirmed by one of the representatives of our  
principal works in Paterson, N. J., and  
others with whom a reporter of *The Iron  
Age* has conversed confirm the statement.  
The indications are certainly very cheering,  
and go far to strengthen the current im-  
pression that our industries are entering  
upon a period of reviving prosperity. But,  
while it is evident that builders are hard at  
work, employing a full complement of men  
and turning out engines in unwonted num-  
bers, they complain grievously of the low  
prices received, both for engines and cars.  
This is mainly accounted for by the sharp-  
ness of competition, rival establishments  
putting in bids at prices which, in for-  
mer years, would have been considered  
ruinous; but if cost can be realized, con-  
tracts are made without hesitation. Some  
of the best engines are made now for \$6500,  
such as would have cost \$14,000 before the  
panic. As remarked by one gentleman  
representing a large concern, "Cars are  
fearfully low—good box cars, of the same  
kind made before the war for \$650, bringing  
now only about \$400." A partial explanation  
of the general low price of engines is af-  
forded by the present low price of labor  
and raw materials. On the other hand,  
careful observation shows that 2000 days'  
work are required to make a locomotive at  
the shop, even after getting flues, wheels,  
axles, &c., made ready to hand outside.  
Altogether, it might be said that 4000 days'  
work are expended on a first-class engine.  
That present prices are very low is obvious.  
Another drawback to the prosperity of en-  
gine and car builders is found in the pre-  
valent disposition to buy on time. In other  
words, many railroad companies are giving

orders for work and paying in Trust Com-  
pany's scrip, and contracts are filled on these  
terms about as cheap as for cash.

The three locomotive shops in Paterson  
are employing, all told, from 1500 to 1800  
men, and if the Rogers Works were not  
temporarily crippled (owing to the recent  
fire) that single concern would have in its  
employ nearly or quite 1200 men. The  
Danforth Works probably have the largest  
force. The last orders received at Grant's  
from the Erie road have been filled, with the  
exception of eight engines yet to be deliv-  
ered, but they are in expectation of orders  
from the same source for 20 passenger en-  
gines in addition. At Danforth's the work  
in hand will keep things running to their  
full capacity until the usual new start in the  
autumn. The Manhattan Co.—late "Metropo-  
litan L"—have ten engines in course of  
execution on order, besides which there are  
engines building for various parts of the  
country. The total deliveries within the  
last four months are exactly double what  
they were in the corresponding months  
1878.

The Paterson Press, describing an engine  
just turned out from the Rogers Works  
which it claims is fully equal, if not superior  
to anything of the kind before produced in  
this country, says: "This engine was built for  
the Louisville, Nashville and Great Southern  
Railroad, and is intended for special use  
mainly to draw a train of palace coaches—  
therefore the idea was conceived to give  
them something worthy of such honor-  
able work. It is especially adapted for swift  
and heavy passenger service. Its cylinders  
are 18 inches in diameter, with 24-inch  
stroke—the largest heretofore made in Pat-  
erson have been 17 inches in diameter—  
and there are four driving wheels of about  
four feet in diameter. It is fixed on a four-  
wheeled radiating truck, and attached is an  
eight-wheeled tender, with tank of 3000 gal-  
lons capacity—a very unusual size. The boiler  
and axles are of steel, the weight of the  
whole being about 40 tons—30 tons is the or-  
dinary weight of a passenger locomotive—  
and it is fitted with air brakes of the most ap-  
proved pattern, and every other attachment  
known to modern locomotive building as an  
acknowledged improvement. The engine has  
no pumps, but is supplied with water by two  
large injectors instead. This engine com-  
pletes the order for 65 heavy locomotives  
furnished by the Rogers Works for the Great  
Southern road; about \$1,000,000 worth—  
not less. As the engine stands on Spruce  
street to-day, being weighed preparatory to  
shipment, it is a model of beauty and  
strength, a real triumph of the great art  
mechanical. The finish is most exquisite in  
all its details, and it is perhaps not too much  
to say—as many are saying to-day—that a  
finer locomotive was never turned out in  
this country at any works. It is precisely  
what is beautifully lettered on the various  
parts, No. 1."

The Baldwin Locomotive Works, Phila-  
delphia, now employ it is said, 1000 opera-  
tives, who are working night and day on a  
large order for locomotives for Australia.

### The New England Manufacturers' and Mechanics' Institute.

Under the name of the New English  
Manufacturers' and Mechanics' Institute, a  
number of gentlemen engaged in the man-  
ufacturing and mechanical interests of New  
England, have formed an association and  
obtained a charter of incorporation. The  
leading purpose of the society is to provide  
a permanent exhibition building, in which  
worthy exhibitions of the best products of  
New England can be made. The subscrib-  
ers announce that it is their intention to  
make this the leading exhibition of the  
country, and feel confident that the associa-  
tion will prove a great stimulus to New En-  
gland industry. Among the stockholders  
named are Governor Talbot, Hon. Rufus S.  
Frost, the American Watch Company, of  
Waltham, the Mason & Hamlin Organ Com-  
pany, John P. Squire & Co., Oliver Ames &  
Sons, the Wakefield Rattan Company, Isaac  
Fenno & Co., Sewall, Day & Co., the Millers  
Falls Company, the Page Belting Company,  
the Abbot-Downing Company, of Concord,  
N. H., and other well-known concerns from  
each of the New England States.

The Executive Committee of the institute  
have issued from Boston the following circular:

DEAR SIR: We desire to call your atten-  
tion to the fact that a number of gentlemen  
engaged in the manufacturing and mechan-  
ical interests of New England have formed  
an association and obtained a charter of in-  
corporation, under the above name, for the  
purposes enumerated in the subscription  
papers herewith sent. The distinctive aim  
of this association is to provide a permanent  
exhibition building, in which the manufac-  
turing and mechanical interests of New  
England can be fitly represented, and  
worthy exhibitions of its products be made.  
This is the principal reason underlying the  
enterprise; but we shall meet a fortune  
entirely different from that which has at-  
tended analogous exhibitions, and one which  
is not suggested by the temper of the  
American people, if we do not make this a  
marked financial success. A fair will be  
held as soon as a suitable place and adequate  
funds can be procured, and thereat  
every year, commencing on the first Wed-  
nesday in September.

We wish no local, partial or narrow as-  
sociation, but one founded on broad prin-  
ciples, open to all industries, and exclusive of  
none; in short, we intend to make this the  
leading exhibition of the country. Thus  
managed we feel confident that the associa-  
tion will prove a great stimulus to New  
England industry. Its annual fairs, at fixed  
and stated times, will soon become advertised  
throughout the world; buyers from the  
States and nations will be attracted to them,  
for nowhere else can they see more or judge  
better than at a well-conducted exhibition.  
Believing that they who will be exhibitors  
should be sharers in the management and  
benefits, the executive committee have  
decided, before accepting offers to take stock  
elsewhere, to give an opportunity to the  
manufacturers and mechanics of New En-  
gland to secure shares in the enterprise in co-  
operation with each other. We estimate that  
if 1000 manufacturers and mechanics of New  
England shall take \$100 worth of stock

"OLDEST" AND "LARGEST"  
And only "Incorporated"  
**TILL COMPANY**  
In the World.  
**FAIRBANKS SCALE COMPANY,**  
WHOLESALE AGENTS.  
Send for Price List and Circular.

**Wilson Bohannon,**  
Manufacturer of Patent  
**BRASS PAD LOCKS**  
For Railroad Switches, Freight Cars, and the Har-  
ware Trade. All sizes, with Brass and Steel Keys,  
with and without chains.  
Patent Horizontal Rim Cylinder Night Latch.  
Self-adjusting to doors of any thickness, with Patent Stop and Drawer Back Knob.  
RIGHT OR LEFT HAND.  
**PASSENGER CAR LOCKS,** Bronzed, Nickel-Plated and Japanned.  
Catalogues and Samples sent upon application. **BROOKLYN, N. Y.**



# H. D. SMITH & CO.,

## Plantville, Conn.,

Manufacturers of the

## BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

## SARANAC HORSE NAIL CO.

### Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

S. P. BOWEN, President and Treasurer.

J. W. LYNDE, Secretary.

All correspondence should be addressed to the Company or to the President and Treasurer.

PLATTSBURG, N. Y.

## SHOVELS, SPADES & SCOOPS.

Patented.

MADE FROM

BEST CAST STEEL.

No. 1124, Size 2.

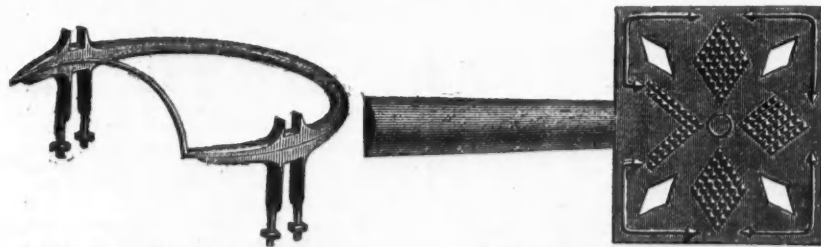
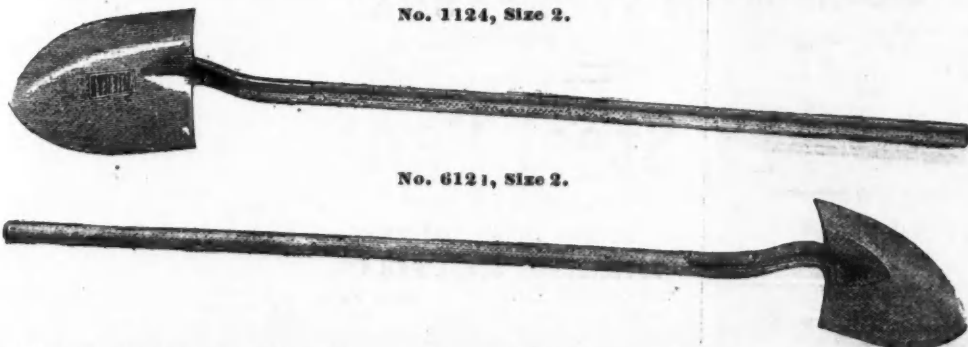
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PITTSBURGH, PA., U. S. A.

Catalogue and prices given upon application.

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Derby No. 2, Fifth Wheel. The most popular wheel in the market.

New Diamond Step. Forged from Norway iron bars.

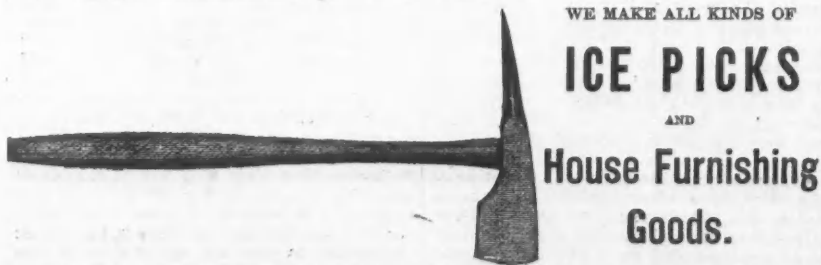
**WILCOX & HOWE,**

Birmingham, Conn.,

MANUFACTURERS OF

First-Class Carriage Forgings, Fifth Wheels, Steps, Body Loops, Stay Ends, Offsets, Long Joint Ends, &c., &c.

Our Illustrated Catalogue furnished to the trade.



WE MAKE ALL KINDS OF

ICE PICKS

AND

House Furnishing Goods.

**ENTERPRISE MFG. CO., Geneva, Ohio.**

Ask for Catalogue and Discounts.

## Philadelphia "STAR" Bolt Works.

NORWAY IRON

FANCY HEAD BOLTS,

Carriage & Tire Bolts.

Star Axle Clips, &c.

TOWNSEND, WILSON & HUBBARD, 2301 Cherry St., Philadelphia, Pa.

MALTBY, CURTISS & CO., No. 34 Reade St., N. Y.,  
HARDWARE MANUFACTURERS AND MANUFACTURERS' AGENTS.

Sole Agents for the

NORWICH PISTOL CO.

Send for circular and price list.



Tin Key Faucet.



Capwell's Giant Nail Puller.

### ROCK BREAKERS.

Blake's Patent Expired—End of Monopoly. The undersigned, sole owners of the old Leviathan, Gates' patent, and the Brown's patent Rock breakers, will guarantee our crushers to break two tons to one of Blake's (or any other.) Send for circulars. Also Stamp Mills and all kinds of Mining Machinery made on short notice.

Office, 52 Canal Street, Chicago, Ill.  
GATES & SCOVILL IRON WORKS.

### NATIONAL STEAM PUMP.

Adapted to every possible duty.

Send for Illustrated Catalogue.

W. M. E. KELLY,

New Brunswick, N. J.

New York Salesroom, 40 Cortlandt St.

### R. COOK & SONS,

Manufacturers of

Carriage & Wagon AXLES.

WINSTED, CONN.

ESTABLISHED 1830.

**AXLES**

All kinds Wagon & Carriage Axles

Manufactured by the  
LAMBERTVILLE IRON WORKS,  
LAMBERTVILLE, N. J.  
Send for prices.



George N. Pierce & Co.,  
BUFFALO, N. Y.,  
Manufacturers of

Bird Cages, Refrigerators

AND  
HOUSE FURNISHING GOODS.

Send for Illustrated Catalogue.  
OPEN STOVE VENTILATING CO.,  
115 Fulton St., New York. Agents.  
J. MACLAY & Co., Agents at Dubuque, Iowa.  
PHILLIPS, BUTTORFF & Co.,  
Agents at Nashville, Tenn.

American Manufacturing Co.,  
4739 Paul St., Frankford, Philadelphia, Pa.,  
Manufacturers of

HARDWARE, NOVELTIES,

Glass Cutters, &c.

SOFT GRAY IRON CASTING.

Send for circulars and prices.



# OLD Boots and Shoes can be Straightened

AND  
NEW ONES KEPT STRAIGHT

BY USING  
LYON'S PATENT  
Metallic Heel Stiffener.

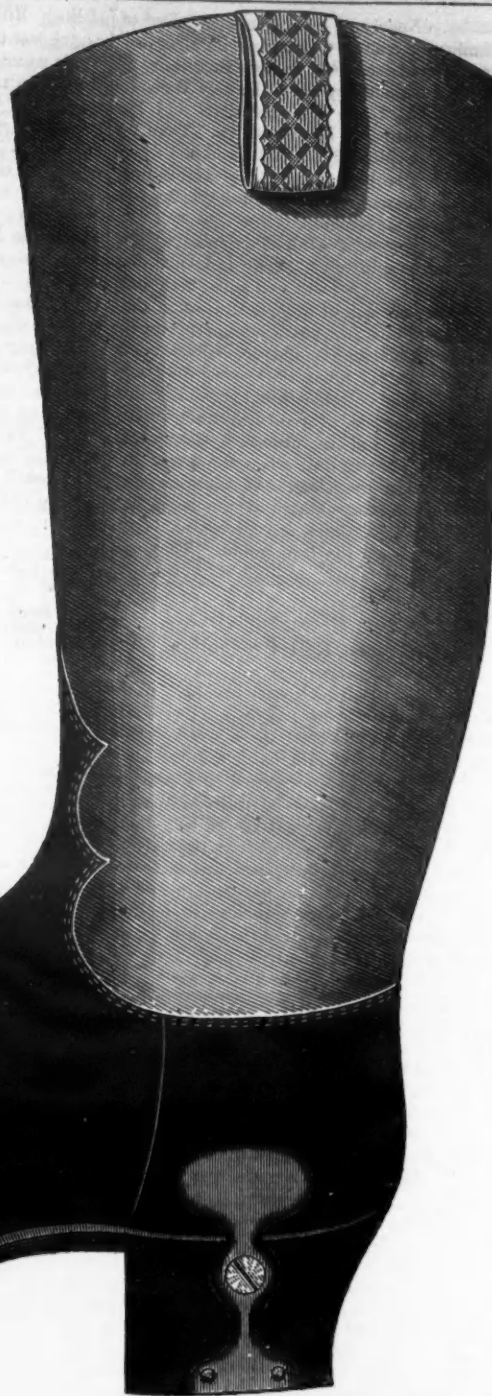
These can be applied to any Boot or Shoe at any time by any one.

Every Pair is Warranted to bend to fit the Boot without Breaking.

All Boxes must be marked, Manufactured only by NELSON LYON,  
Albany, N. Y., under Patents of July 9, 1872, May 18, 1875, July 11, 1876.

CATALOGUES SENT FREE.

For Sale by all Wholesale and  
Retail Hardware Dealers.



NELSON LYON, Sole Manufacturer, Albany, N. Y.

**BLACK AND TINNED IRON RIVETS.**

5 oz. 1 lb. 1 1/4 lb. 1 1/2 lb. 2 lb. 4 lb. 6 lb. 7 lb. 8 lb.

CURVE HEAD. TROUS HEAD. CONE HEAD. ROUND HEAD. COUNTERSUNK HEAD. STEEPLE HEAD. GLOBE HEAD.

W. P. TOWNSEND & CO.,  
PITTSBURGH, PA.,  
Manufacturers of every description of First Quality  
**RIVETS.**

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## The Water Supply of Cities.

Few of even the medium-sized cities of the United States are without some system of water supply and distribution. Philadelphia was first in the inception of such works, which was effected by the construction of a dam across the Schuylkill, with breast wheels and pumps raising water into a reservoir, and then distributing it through the city. The breast wheels have given way to the more efficient turbine, and the supply has been supplemented by steam pumping engines, both on the Schuylkill and in the Delaware.

New York is supplied by gravitation, bringing the water from the Croton through some 38 miles of brick aqueduct and some iron conduit. The iron conduit or pipe lines across Harlem and Manhattan Valley have been increased in capacity. A large receiving reservoir of 1,000,000 gallons capacity, and two large catch basins on the Croton River have been constructed since the completion of the works, together with two pumping engines of 10,000,000 gallons per 24 hours' capacity, for the supply of the highest parts of the city. The daily supply is now about 90,000,000 gallons.

Boston has also a gravitation supply from Lake Cochituate, but has lately constructed an entirely new aqueduct, taking all the upper waters of the Sudbury River. By the annexation of Charlestown, the pumping works of Mystic Pond have been added. The total daily supply is now about 30,000,000 gallons.

The supply of Washington is also by gravitation from the Potomac, and is the largest in quantity in proportion to the number of its inhabitants. But, in general, most of the cities are supplied by steam pumping engines.

Usually with all city water works there are reservoirs. In some cases the pumping is directly into the main, without reservoirs. In Sandusky the engineer, Mr. J. D. Cooke, has introduced, as an economical construction, under the conditions of position, a very large stand pipe, serving, in a measure, as a reservoir, with a small central pipe which will be useful in putting an extra head on the mains in case of fires. The large pipe is 25 feet inner diameter, 180 feet high; the central pipe 8 feet diameter, 230 feet high. The large pipe is of steel plate, having a reliable tensile strength of 70,000 pounds. The plates build 4 feet per course, each course being composed of 6 plates, first and second course 3/4 inch thick, 3 rows of 1 1/2 inch steel rivets, then reducing by each two courses the thickness of the plates by 1-32 inch; the 43d and 45th course, inclusive, is 3-16 inch plates, 1/2 inch rivets, double. The rivets were changed from triple to double rows at 24th course. The top is finished with galvanized iron cornice; the whole thoroughly painted inside and out. Influent and effluent pipes pass into and through the shell of large pipe near the bottom. Either pipe can be used independently of the other; valves so arranged that the engineer can change to either pipe without leaving the engine house.

The types of pumping engines used at the different works are extremely varied. The pumping engines of Mr. Leavitt are compound engines, with the steam cylinders inclined to each other, and at their bases are close to each other as possible. The connections are with opposite ends of the beam, and the channels between the cylinders are short as possible. The fly-wheel connection is with one end of the beam and the pump connection with the other. This type of engine, of which there are three in operation—one at Lynn and two at Lawrence—both in their tests by experts and every day running, have given the best percentage of effect of any in the country.

The Worthington engine is the legitimate growth from the donkey engine, which was first introduced for the feed of boilers by Messrs. Worthington & Baker. In its present form, as a pumping engine for water supply to towns, it is a compound horizontal engine, with two sets of high and low pressure cylinders, and its distinctive character is, that the steam valves of one set of cylinders are moved by the piston rods of the other. There are, probably, more of these engines than of any other one type; they are well adapted to a very fair percentage of duty, and they are economical in first cost, including foundations, and repair in working. They are of medium size, the largest in operation having a capacity of 8,000,000 gallons per 24 hours.

The St. Louis engines are of the largest capacity of any in this country. Engines Nos. 1 and 2, high service, are simple beam engines, with the pumps beneath the steam cylinders and directly connected; the crank connection is with the opposite extremity of the beam. The pump is of a type first introduced by Mr. Wm. Wright at the Brooklyn Water Works. The pump cylinder being inclosed in an annular cylinder, acting as a supplementary pipe to the pump, and afford-

ing more ample passage for the water than could be secured through the pump bucket alone. Engine No. 3, high service, is a coupled compound beam engine, with the two steam cylinders set close to each other and attached to the same side of the beam. The pump and crank connections are with the opposite ends of the beams. At the low service the water is pumped from the river into subsiding basins, and thence, by the high service, into the mains and reservoir. Engines Nos. 1 and 2, low service, are Bull engines, that can be run coupled. No. 3 is a beam engine, with two plunger pumps, one beneath the steam cylinder and directly connected therewith. On the piston rod there is a connection with the extremity of a beam, at whose other extremity there is another pump and a fly-wheel connection. This pumping engine has two distinct condensers, the first in connection with a regular air pump on the main piston-rod, which is supplied by injection from the clear water main of the city, and the condensed water is used entirely for the supply of the boilers, at from 140 to 150 degrees. The other is a syphon condenser supplied from the pump chamber with river water, and the condensation is effected by means of a sprinkler. All this condensed water is returned to the river.

Of late, all the pumping engines of a capacity of 5,000,000 gallons per 24 hours, and above, have been fitted with compound engines. The St. Louis engine, No. 3, may represent the type of Milwaukee, Chicago and Lowell. In the Yonkers engine, Mr. Wright has placed the cylinders vertically and at opposite ends of the beam. There are a great many Bull and Cornish engines used for the supply of towns and drainage of mines, and the English pump of Drury has been introduced into California. The pumps of the Holly system are inclined cylinders, with directly connected pumps beneath and a connection above with a crank on a fly-wheel shaft, usually with four cylinders, two at each end of the shaft, and arrangements to work either simply or compound.

The forms of boilers are, perhaps, more varied than that of the engines. The most usual types are the horizontal tubular, fired underneath and returning through the tubes; the drop flue, horizontal with large flues to a back connection, then returning through smaller flues or tubes to a front connection, thence out at the bottom and back to the chimney; and the Cornish.—Trans. Amer. Soc. of Civil Engineers.

## LABOR AND WAGES.

The coal miners on the Panhandle, West Pennsylvania, resumed work on the 9th, after an 8 weeks' strike. It seems the union supplied all the food necessary to keep up the war, but idle miners from other sections began to flock in, and a number of them getting work at Midway, the strikers began to think they might get too firm a foothold and decided to compete with them. The difference of opinion between operators and operatives is said to have been 10 cents a ton. Though operations have not been generally resumed, it is thought they will be ere long.

The strike of longshoremen in this city cost the steamship companies \$250,000. The strikers have returned to work on the companies' terms.

The miners employed by the Mineral Ridge Coal Company, numbering about 150, came out on a strike Wednesday morning, asking an advance of 20 cents a ton. The men at Catfish and Hillville, below Monterey, also came out. They had a meeting outside of town in the afternoon, in which they were joined by the men from the adjoining mines. Officers were elected, speeches made, bands played, banners and flags floated in the breeze, and resolutions were adopted to the effect that they would not go to work again till the asked for concessions were made. An advance of 20 cents per ton is demanded.

The Employees of Vanderbilt.—The roads which are controlled by the president of the New York Central and Hudson River (he is president of all, except three, which have together 640 miles of road) have an aggregate length of 3620 miles of road and 6102 miles of track. On these were employed, according to the Railroad Gazette, by recent pay-rolls, 27,706 men, who received, in round numbers, \$1,178,000 per month, or more than \$14,000,000 per year. There is probably but one other case in the world where so many men are under the orders of a single man not an army officer or government official. The number is somewhat greater than that of the United States army as it now stands. The roads on which this force is employed, the mileage of road and of track, &c., are as follows:

	Mile of Road.	Total men.	Monthly pay-roll
New York Central & Hudson River	866	2,277	\$465,000
N. Y. & Harlem	134	195	37,000
Lake Shore & Michigan Southern	1,176	1,874	398,000
Canada Southern	443	450	68,000
Michigan Central	804	1,068	188,000
Dunkirk, Allegheny	90	101	14,000
Val & Pittsburgh	107	118	265
Rochester & State Line	107	118	265
Total	3,620	6,102	\$1,178,000

The aggregate amount of the capital stock of these corporations is \$186,116,504, and its average value at the present market price is but little below par, the premiums on the large amount of New York Central and Harlem stocks nearly balancing the discounts on the other stocks.

The German Cast Iron Forts.—The new solid iron fortifications at the mouth of the Weser, in the north of Germany, have just been finished. There are three forts, containing nine 21-centimeter guns and 10 revolving turrets, accommodating 15 guns of 15 and 28 centimeter caliber. These solid iron structures have a total weight of 7650 tons, present convex and oval fronts to the enemy, and are able to resist the heaviest artillery known. The loopholes open at the moment of firing, being ordinarily protected by oval valves of the same solid material. Both batteries and turrets are provided with ventilating apparatus and hydraulic engines for working the guns.



# The Iron Age

AND  
Metallurgical Review.

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### CONTENTS.

First Page.—Early Specimens of Mild Bessemer Steel. Scientific and Technical.

Third Page.—British Iron and Steel Institute.

Fifth Page.—Metallurgical Notes. A Brick-making Center. The Manufacture of Phosphorus. Overloading Freight Cars.

Seventh Page.—Production of Iron and Steel in France in 1878. A Recent Arbitration Decision in the English Coal Trade. The Jablockhoff Electric Light in London.

Ninth Page.—Industrial Items.

Eleventh Page.—Industrial Items (Continued.) The New England Manufacturers' and Mechanics' Institute.

Thirteenth Page.—The Water Supply of Cities. Labor and Wages. The Employees of Vanderbilt. The German Cast Iron Forts.

Fourteenth Page.—Indications of Returning Prosperity Furnished by the Railroads. American Rail Production. M. Leon Chotteau. The Stove Trade in Council. Sir Henry Bessemer.

Fifteenth Page.—The Leadville Silver-Lead Deposits. Anti-Clinker Patents. Organizing the New York International Exhibition. Mexico—Her History, Position and Commercial Possibilities. Civil Engineers' Convention.

Sixteenth Page.—A Recent Interesting Electrical Instrument. A Fraud Detected by Chemistry. Artificial Production of a Mineral.

Seventeenth Page.—Trade Report. General Hardware. Iron. Metals. Exports. Imports. Coal. Old Metals. Paper Stock, etc.

Eighteenth Page.—Philadelphia. Pittsburgh. Chattanooga. St. Louis. Boston. Cincinnati. Baltimore. Louisville.

Nineteenth Page.—Richmond. Our English Letter. Foreign. Progress of Car Building. The Impending Revolution in the Iron Trade.

Twentieth Page.—The Late William Adamson of Philadelphia. The Striking Coal Miners. The Semi-Annual Meeting of the National Stove Association.

Twenty-second Page.—The Semi-Annual Meeting of the National Stove Association (Continued).

Twenty-third Page.—The Iron Age Directory.

Twenty-fourth Page.—The Semi-Annual Meeting of the National Stove Association (Continued).

Twenty-sixth Page.—New York Wholesale Prices.

Twenty-seventh Page.—New York Wholesale Prices (Continued).

Thirty-fifth Page.—Philadelphia, Buffalo, Chicago and Pittsburgh Hardware and Metal Prices.

Thirty-sixth Page.—Boston and St. Louis Hardware and Metal Prices.

Lord Odo Russell, the British Ambassador at Berlin, has recently transmitted to his government dispatches containing the information that Germany has the intention of abandoning the gold standard, to which she so recently successfully attained at great sacrifice. It is said that the government is preparing for the change to bi-metallicism by suspending its sales and accumulating silver, of which it now holds nearly \$50,000,000.

The Labor Tribune, in the wilderness of its enthusiasm over what it terms the victory of the workmen in the recent strike at Pittsburgh, forgets both history and facts, and confounds words and terms in a most surprising way. Here is a choice sample: "The Saviour of the world formed a union to propagate the faith (and Judas Iscariot was the first scab)." The Tribune mistakes the facts. The Saviour was the master, the apostles his servants (workmen), and Judas was the first striker, and got what he struck for—30 pieces of silver.

## Indications of Returning Prosperity Furnished by the Railroads.

It has been a favorite theory with some very shrewd men that, as the collapse of railroads and railroad building in 1873 was largely the cause of the depression in the iron trade, as well as in other branches of business, we cannot expect any decided and permanent improvement in iron until there is a decided improvement in the railroad business of the country. This improvement must not only take the form of an increase in net earnings, but in new construction and extensions as well. It is this belief that has given iron manufacturers such an interest in the statements that the trunk lines put forth from time to time, showing their earnings and operating expenses, and it has also given the records of railway projects and building an unusual importance.

That there has been a decided improvement in the financial condition of our railroads, as evidenced by their monthly and yearly statements, admits of no question. Excepting the time during which the present cutting of rates has continued, the trunk lines and many of the local lines and feeders have shown a marked increase in net earnings. The *Railroad Gazette* has compiled reports from 89 lines which operated, in 1878, 29,835 miles of road. These reports show that the gross earnings were \$221,807,085, and the net earnings \$90,366,363. Compared with the previous year there was an increase of 4.1 per cent. in gross, and of 7.2 per cent. in net earnings, the mileage being but 2.2 per cent. greater. The gross earnings per mile of road increased from \$7304 to \$7437, or 1.8 per cent., and the net earnings from \$2887 to \$3029, or 4.9 per cent. These roads comprise about three-eighths of the total mileage of the country, but they are very unevenly distributed. We are aware that net earnings may be increased in ways that will not always bear inspection nor the test of time. They may be made to show an increase by cheating maintenance of way and motive power and rolling stock of their just dues, or floating debts may be allowed to increase. It is evident, however, that the increase shown in the above figures and in others that have been published from time to time, is too great and too continuous to be the result of a failure to keep road beds and rolling stock in good order. An increase of net earnings cannot long be the result of such causes. Either the road must be put in a fair condition and a reduction of net earnings ensue, or there will be accidents and irregularities of service, or failures to move freight and passengers promptly, which will show the condition of track and stock. Nor has this increase of net earnings come from an increase of floating debt. Some of the most important trunk lines have largely reduced this within the past two years even, and yet showed an increase in net earnings. The facts all go to prove that the increase has come from a legitimate decrease in expenditures and, in many cases, a marked increase in receipts. This indicates an improvement in the railroad business of the country that should be full of encouragement to those who hold the theory to which we referred at the beginning of this article.

If we go still further and inquire as to the causes of this improvement, it is full of encouragement to everybody. We do not propose now to consider these causes in detail, but in a single sentence they can be stated to be—an increase in the volume of the business of the country which promises to be permanent. The good crops, the increase in immigration, both inland and foreign, in building, and in the demand for agricultural and farming implements and tools resulting from these, are some of the causes. These causes, which promise permanence, also indicate that for a few years, at least, we may expect an increasing prosperity in the business of railroads. There is but one obstacle to this—the foolish and ruinous cutting of rates that is unhappily too common. If some way can be found to end this and give assurance of fair and equitable rates, the railroads of this country that are well located will have no cause to complain of the volume of business.

The second source of encouragement is found in the number of new projects contemplated and under way. The outlook for extensions for 1879 is most flattering. Good judges place the number of miles that will probably be built as high as 10,000. This, which is some 2400 miles in excess of the new mileage of any previous year, is, without doubt, largely an overestimate. It is a fact, however, that never in the history of the country was there such activity in railroad building. There is, for example, scarcely a prominent line of railway west of the Mississippi that is not extending its own line, or directly or indirectly building feeders. The Northern Pacific has just let 200 miles of road. The Utah and Northern will build 100 miles this year to the Union Pacific, and the Central Branch of the Union Pacific have 107 miles under contract. The Southern Pacific is pushing eastward, and the Texas Pacific westward. The ink on the decree in favor of Denver and Rio Grande was hardly dry, before projects involving the building of 565 miles were made public. Its rival—the Atchison, Topeka and Santa Fe—is pushing equally extensive projects, and at the same time the Iron Mountain Railroad is reaching out after the same trade. The Alton Railroad has just finished its extension to Kansas City. The St. Louis, Kansas City and Northern is pushing the construction of its line to

Omaha. Nearly, if not quite, every line of prominence out of Chicago is building extensions and feeders. In the East there is not so much activity as in the new Western country, but there are extensions and rumors of extensions all around us. Take up any of our railroad journals, and the number of new projects, even in the older States, will surprise one who has not kept the run of railway movements.

All these facts are full of promise to our iron manufacturers. Their influence has been felt already. Our rail mills, both iron and steel, are full of orders, and some that have been idle for years are preparing to start, or have already done so. Mills working on track bolts, splice bars, lock nuts, and the multitude of other things that enter into the construction of road-bed and rolling stock, are full of orders. Car works that have not run full since the panic are now making overtime. If there is any merit in the theory stated at the beginning of this article, there are prosperous days just ahead for the iron trade. They can come none too early to find it waiting to welcome them.

## American Rail Production.

The railroads which were first built in the United States used a rail made of ordinary flat bar iron, fastened upon wooden sills. Of the particular mills which rolled these flat rails we have no record, but presume that the mills nearest the railroads usually produced them. According to Mr. James M. Swank, to whom the iron trade is indebted for so many historical and statistical facts, the first mill in the country to roll heavy railroad iron, intended to be used without wooden sills, was the Mount Savage Rolling Mill, in Alleghany County, Maryland, which was built in 1843, and commenced to roll rails in 1844. It is singular that Pennsylvania was not the first state to roll rails, but it must be remembered that the first railroad in the United States more than ten miles in length was built in Maryland—the Baltimore and Ohio Railroad. Pennsylvania, however, followed closely on the heels of Maryland in the manufacture of heavy iron rails, the Montour Iron Company's mill at Danville, Montour County, now owned by Waterman & Co., beginning to roll rails in October, 1845; the Phoenix Iron Company, at Phoenixville, Chester County, and the Brady's Bend Rolling Mill, at Brady's Bend, Armstrong County, followed in 1846; and the Rough and Ready Rolling Mill, at Danville, now the Glendower Iron Works, and the Safe Harbor Rolling Mill, at Safe Harbor, Lancaster County, followed in 1848. Three other States began to make heavy iron rails in 1846—Massachusetts, New Jersey and Rhode Island. In Massachusetts the Boston Iron Works first rolled rails on May 6, 1846, followed by the Bay State Rolling Mill, also at Boston, early in 1847. The latter mill was then owned by the Massachusetts Iron Company. In New Jersey, Cooper & Hewitt first rolled rails on June 19, 1846, in the mill at Trenton, now owned by the New Jersey Steel and Iron Company. In Rhode Island, the New England Iron Company, of Providence, first rolled rails about September 1, 1846, in the mill now owned by the Providence Iron Company, which was built to roll rails, but in 1848 was converted into a nail mill and discontinued rail rolling. From 1850 to 1856 five other States began to make rails—New York, at Troy; Virginia, at Wheeling, now in West Virginia; Kentucky, at Covington; Michigan, at Wyandotte, near Detroit; and Ohio, at Cleveland. In 1856 there were nineteen completed rail mills in nine States, most of the mills being located in Pennsylvania. Their distribution and production are exhibited in the following table, which has been compiled from the statistics collected by Charles E. Smith, and published among the records of the American Iron Association about 1858:

States.	No. of mills.	Net tons rails.	Per cent. of total.
Pennsylvania.....	11	95,014	59.5
Massachusetts.....	1	20,016	12.6
New York.....	1	15,133	9.5
New Jersey.....	1	14,350	9.1
Maryland.....	1	8,018	5.0
Virginia.....	1	2,638	1.7
Kentucky.....	1	2,213	1.3
Michigan.....	1	2,070	1.3
Ohio.....	1	0	0
Total.....	19	159,662	100.0

From 1856 to 1860 the manufacture of rails was extended into three more States—Indiana, at Indianapolis; Illinois, at Chicago (the North Chicago Rolling Mill); and Georgia, at Atlanta. From 1860 to 1870 four States joined the list of rail-making States—Tennessee, at Chattanooga; Maine, at Portland; Wisconsin, at Milwaukee, and California, at San Francisco. Since 1870 rail mills have been put into operation at St. Louis, Missouri; at St. Albans, Vermont; at Topeka, Kansas; at Laramie, Wyoming Territory, and at Pueblo, Colorado; the Pueblo mill, however, having, since the summer of 1878, been removed to Denver. A rail mill is in course of erection at Ogden City, Utah Territory. At the present time there are rail mills in 20 States and one Territory, not including the unfinished Utah mill. Bessemer steel rails are rolled in five States—New York, Pennsylvania, Ohio, Illinois and Missouri, though the steel works in the last named State have been idle for the past two years. Open-hearth steel rails are rolled in Vermont and Tennessee.

The progress made in the manufacture of rails of all kinds in the United States is best indicated by the figures of production. In 1849, five years after the Mount Savage

Rolling Mill had begun operations, only 24,318 net tons of rails were rolled in the whole country; in 1850, 44,083 tons were rolled; in 1855 the production had jumped to 138,674 tons; in 1860 it had only progressed to 205,038 tons; in 1865 it was 356,292 tons; in 1870 much progress had been made, as the production was then 620,000 tons; in 1872 the maximum was attained, 1,000,000 tons; in 1874 the lowest point in the recent depression was reached, 729,413 tons; in 1878 the production was 882,685 tons. It is expected that in 1879 the production of rails will equal, if it does not exceed, that of 1872.

The number of rail mills of all kinds in the United States, rolling light and heavy iron and steel rails, is now 93, which is almost five times as many as there were in 1856. In 1878 they produced nearly six times as many rails as were made in 1856. The distribution of the rail mills in 1878 and their production are shown in the following table:

States.	No. of mills.	Net tons rails.	Per cent. of total.
Pennsylvania.....	37	405,256	46.05
Illinois.....	8	106,538	12.06
Ohio.....	18	87,520	9.95
New York.....	7	54,471	6.17
Wisconsin.....	1	28,000	3.24
Indiana.....	4	28,560	3.24
Kentucky.....	4	13,000	1.47
Kansas.....	2	12,085	1.37
Wyoming Territory.....	1	10,425	1.18
Tennessee.....	3	9,479	1.07
Georgia.....	1	8,345	.94
Massachusetts.....	2	7,995	.90
California.....	1	6,779	.76
Maryland.....	2	3,000	.34
Maine.....	1	3,000	.34
Vermont.....	1	2,000	.23
Colorado.....	1	1,600	.18
West Virginia.....	2	1,230	.14
Missouri.....	1	362	.04
New Jersey.....	1	8	.001
Michigan.....	1	0	0
Total.....	93	882,685	100.00

The four States which stand first in the above table, have for a number of years made many more tons of rails than all the remaining States. In 1871 they made 76 per cent. of the total production of the United States; in 1872, 78 per cent.; in 1873, 74 per cent.; in 1874, 70 per cent.; in 1875, 78 per cent.; in 1876, 79 per cent. In 1856 Pennsylvania, Massachusetts, New York, and New Jersey made 91 per cent. of the total production of rails in the Union, while Illinois and Ohio, now among the leading railmaking States, rolled none in that year.

## M. Leon Chotteau.

The versatile gentleman who has been in this country for some time, doing what he is pleased to consider missionary work in the interest of the movement looking to reciprocity with France, is beginning to find out that all of his expectations are not likely to be realized. He has been well advertised, and this fact has led people to believe that he had some claim upon the popular notice—which, so far as we can learn, is a mistake. Generally speaking, he has been courteously received and considerably treated by the press; and the boards of trade, before which he has lectured, have listened to him with more or less interest, and passed certain cut and dried resolutions, which, so far as nine-tenths of those voting on them are concerned, are no more significant of public sentiment than was the overwhelming "aye" vote which George Francis Train always received when he asked his audiences whether they wanted to see him the next President of the United States. Misled by this courtesy and apparent interest, M. Chotteau has fancied he was having a great success; but he might have advocated a tunnel railway from New York to Liverpool with equal success, and found no more difficulty in securing the passage of resolutions to the effect that such a railroad would be a good thing. But at last M. Chotteau has met his Waterloo, and we understand that he is on his way to Washington, disheartened and disgusted. Having secured permission to address the San Francisco Chamber of Commerce, M. Chotteau went thither to expatiate upon the beauties of reciprocal trade with France. But the good people of San Francisco have a vigorous, breezy way of expressing themselves, and when M. Chotteau had made his customary speech, one of the members rose and fell upon him, and smote him hip and thigh with facts and figures of the most unanswerable kind. It must be confessed that in his patriotic enthusiasm the speaker somewhat overstepped the bounds of courtesy. He told M. Chotteau that he was nothing more than the agent of certain French manufacturers, who were seeking to secure the acceptance of a treaty framed in their own interest. This may not be polite, but it is unpleasantly true, and, instead of passing M. Chotteau's cut-and-dried resolutions, the San Francisco Chamber adopted resolutions of a very different kind, which were to the effect that M. Chotteau was nobody in particular, and that the best thing he could do would be to return home without unnecessary delay. M. Chotteau concedes that he was annihilated, but thinks he might have been given a chance to retire from the hall before the San Francisco Chamber sat down upon him.

Whether M. Chotteau has anything to complain of in his reception at San Francisco, is an open question. Probably not. He represents a little clique of manufacturers of wine, chocolate, silks, &c., who want to see such a treaty for reasons of their own, and who are willing to spend money in employing M. Chotteau to make speeches in this country. It is but just to him to say that he has worked earnestly and skillfully; but why this should give him any more claim to

public attention than would be accorded to the traveling agents of these same manufacturers, sent here to solicit orders, is not apparent. Had the nature of his errand been understood, his movements would not have been telegraphed nor his speeches reported in the newspapers. When it is remembered that he has no authority to tender the people of this country the reciprocity with France which he so persistently advocates, his mission loses all public interest, and his only claim to considerate treatment rests upon the good nature and generous forbearance of the American people. If he should choose to hire a hall and lecture on our commercial relations with France, he would be at perfect liberty to do so; but in coming before Chambers of Commerce and Boards of Trade with voluminous announcements, and pretending that the movement he advocates is in the interest of the American people, he invites rebuff and is entitled to expect somewhat unceremonious treatment. That he has not sooner been demolished by facts and figures, is probably due to the fact that those who could have done so have known that he spoke without the authority of recognition from his own government or ours, that he was unlikely to accomplish anything, and that it was scarcely worth their while to answer him. Now, however, they will be apt to take a different view of the matter, and we predict that his longer continuance in the work he has undertaken will be neither pleasant nor profitable.

## The Stove Trade in Council.

The summer meeting of the National Association of Stove Manufacturers, held during the week in Boston, was in all respects a great success. The attendance was large, the interest great, the weather agreeable, the accommodations superior, the hospitality of the Boston manufacturers unlimited, and the results of the discussion of practical value. In other columns of this issue we give a full report of the proceedings of the first meeting of the session. Owing to the amount of space it occupies, we are compelled to leave the report of the second day's proceedings until next week.

Included in our report herewith given, are two papers prepared by request of the committee having this matter in charge, and read during the meeting of Wednesday. One is by Mr. G. F. Filley, of St. Louis, and the other by Mr. J. C. Bayles, of New York. Considering the fact that these papers were prepared without consultation, and that neither writer knew that the other would speak, it must be confessed that there is a rather curious coincidence in the choice of subjects and their treatment—the more so as one is based chiefly on practical experience, and the other chiefly on theoretical deductions. It is probable that both will be read with interest by the trade, and that they will not be without good results in encouraging experiment and stimulating inquiry.

The discussions of the association suggest many topics which invite editorial examination, but the want of time and space forbids their consideration this week.

## Sir Henry Bessemer.

Mr. Henry Bessemer having been knighted by Her Majesty the Queen, will henceforth be Sir Henry. This is a graceful exercise of the prerogative of royalty, and a tribute to practical worth which is not undeserved. The recipient of the honor, which in these days is an honor indeed, has won the golden spurs fairly. His success was only achieved after struggles with difficulties which would have discouraged ordinary men. His claim to recognition as a great benefactor of his race, is based less upon his actual inventions than upon his persistent and successful efforts to make of practical value a process which had previously been tried with indifferent success. That Mr. Bessemer had to divide the honors, and to some extent, the profits of success with an American inventor, does not detract from the value of his personal services. The world is the better for his living. The honors and wealth which have come to him have been earned, and we hope his declining years may be free from cares and disappointments. Few men have so deeply stamped the impress of their own names upon this "Iron Age" as Mr. Bessemer, and few can so well afford to share their honors with those who have been mainly instrumental in perfecting the Bessemer plant and process. The years have not for him come and gone empty handed, nor is it left for posterity to recognize the value of his service in the cause of human progress.

In another column we print a communication of great interest, from a correspondent in Galveston, on the history and present position of Mexico, and the encouragement there offered to those interested in extending our export trade. We invite for this letter careful consideration. The writer knows whereof he speaks, and his enthusiasm is not without an intelligent reason. Mexico is not appreciated by the American people. Her position has been misunderstood, her struggles misinterpreted, her people misjudged. The story of her revolutions, as told by our correspondent, throws a new light on her history, and shows what heroic self-sacrifice her people have struggled to right the wrongs of centuries of Spanish misrule.



### The Leadville Silver-Lead Deposits.

The general public, as well as the narrower circle of miners, capitalists and the metal trades, have been agitated for a long time by conflicting statements as to the mineral resources of Leadville, Col. Excitement has run high and a wild rush, such as we have often seen since the early California days, was made to the new Eldorado. Now that the actual work of development has far advanced, and some mines have entered quite largely upon the producing list, a more careful survey and examination is possible. Though there are still many unsolved problems which must await the results of present and future developments for their final settlement, so much is already known that a tolerably accurate description of the deposits can be made. That they are vast, rich and likely to prove productive for many years to come, there can be no doubt, although their capacity of production can only be estimated with some degree of certainty when increased facilities of transportation shall have rendered the large masses of low-grade ores available for profitable extraction. The cost of hauling supplies, fuel and machinery to Leadville, and of shipping the product, is still so great that only high-grade ores can yield returns. This, however, is expected to be changed as soon as the railways now building shall have reached the new camp.

Leadville is located on the Arkansas River, which, at a point about 130 miles above Canon City, runs in a southerly direction, the valley being bounded on the west by the foot-hills and main range of the Rocky Mountains, of which Mounts Elbert and Massive are the highest peaks, and on the east by the Mosquito range. The height of the latter varies from 10,000 to 13,000 or 14,000 feet above the sea level. Flowing into the Arkansas from the east at this place is a small stream, which comes down through a cañon in the Mosquito range, known as California Gulch. This stream has been the scene of extensive placer gold mining, which has been carried on with varying success since its discovery, about 1859. The gravel in the bed of this stream has all been washed out, from its mouth about five or six miles up into the mountains. The entire amount of gold taken out of this gulch in the last 20 years is estimated at \$3,000,000 or \$10,000,000.

It was while prospecting in this gulch that W. H. Stevens and W. Wood, old and experienced miners, discovered masses of a heavy mineral which, upon examination, turned out to be lead ore rich in silver. Quietly pursuing their work, ostensibly searching for gold, Stevens and Wood followed out their discovery, notwithstanding the scoffing and jeering of all the miners of the vicinity. In 1875, Stevens began to survey for patents, and in 1877 commenced work on the Iron Mine outcrop, on the hill north of California Gulch, the Iron Hill. Other early locations were the Adelaide and the Camp Bird, both on the same vein. In 1877 the Carbonate Mine was discovered, on Carbonate Hill, west of Iron Hill, on an outcrop which lay lower than that of the first discovery. This was followed, in the spring of 1878, by the location of claims on Fryer Hill, north of Carbonate Hill, from which it is separated by the Stray Horse Gulch. The first mine opened was the New Discovery, which, however, was soon eclipsed by the Little Pittsburgh. The veins of ore are situated between beds of limestone and porphyry, and it seems that through faults, no less than four outcrops are located, one above the other, each covered by porphyry and overlying limestone. The lowest of these is that opened by the Fryer Hill and Carbonate mines, the next forms the vein worked by the Iron and other mines, and the one following, which is above timber line, supports the Dyer Mine. Another vein, as yet unproductive, is known to exist at a greater altitude, but, as yet, its inaccessibility has been unfavorable to prospecting. The veins are by no means regular, varying much in thickness, as well as in value. Their contents are iron and lead ores, the former of which contain generally only small amounts of silver. The latter consist chiefly of carbonates of lead and some galena, the sulphide of lead, together with silver and much quartz. There are two varieties—the soft "sandy" and the "hard carbonates," the former being higher in silver. The galena occupies an intermediate position between the two, running higher in lead, but lower in silver, than the sandy ore, but higher in silver and lower in lead than the hard carbonates. The ores contain silver worth from a few dollars to hundreds of dollars per ton. The average yield is said to be from 100 to 150 ounces per ton, although a large proportion of the mineral taken out of the Carbonate and other mines has assayed as high as from 300 to 400 ounces per ton. The dip of the veins, that is, the angle of their inclination, varies from 15 to 20 degrees, though it is by no means regular. It is reported that the depressions formed by irregularities of the dip are generally filled with ores rich in silver, while the ridges frequently turn out to be barren. A highly interesting feature of the geology of the Leadville deposits has been described and illustrated by Mr. Carl Henrich, in a paper contributed to the *Engineering and Mining Journal*. It was discovered that in the Carbonate and Etna mines the vein which has been usually found to dip to the east into the hill, takes a sudden turn and is inclined steeply westward. This has been

confirmed by a recent strike in the Pender Shaft, which, being located to the west of the outcrop on Carbonate Hill, was supposed to lie outside of the mineral region.

As for the present production of Leadville, it would seem that the sanguine hopes of its promoters are not to be realized, at least during this year. It was confidently predicted that the output of lead would rise to from 20,000 to 25,000 tons. These figures have now been modified to 10,000 tons. But, as we have already stated, this is due to present difficulties which railroad communication will speedily remove. Then, probably during 1880, Leadville will take its rank as one of the greatest lead and silver producing centers of the country.

### The Anti-Clinker Patents.

It is well known that for some years past extensive litigations have been in progress between Messrs. Perry & Co., of Albany, on the one side, and the Anti-Clinker Association on the other, looking to the control of the so-called "Anti-Clinker" grate as used in stoves, ranges and furnaces. These two parties have endeavored to enforce against each other claims and counter-claims under rival sets of patents. Naturally, the trade has been deeply interested in the controversy, since the construction to which it relates has been so widely adopted that the triumph of either party in the suits would bring the whole trade, manufacturers and dealers, under contribution to the successful patents.

In the progress of these suits the litigants became convinced that each held valid patents vital to the building of this class of stoves. The probability that the courts would so decide at the approaching trials, made it apparent that the convenience of the parties themselves, as well as of other manufacturers and of the trade at large, demanded that there be a union of these conflicting interests. To this end negotiations have for some time past been going on between the parties, and, as the result of the same, an arrangement has been consummated whereby Perry & Co. and the Anti-Clinker Association, uniting with Mr. James Spear, of Philadelphia, make an assignment to John S. Perry and Grange Sard, Jr., of Albany, of all their patents, some fifteen or twenty in number, relating to this subject.

The two gentlemen named are to act as trustees for the various parties in interest, and are duly empowered to make settlements for past infringements, to grant licenses for future use, and to bring suits to enforce their rights. Of course, the various patents will now be worked in harmony, and it is understood to be the intention of the trustees to charge no higher royalty under the combination than each party had been demanding previously for himself alone, a truly wise and liberal policy.

We heartily congratulate the trade upon this adjustment of an important but heretofore perplexing question. The anti-clinker grate, beyond question, is one of the most valuable improvements made in stoves for the last twenty years. So apparent was its superiority over the older constructions, that but few seasons had passed after its first introduction before it had been almost universally adopted in parlor and cooking stoves, ranges and furnaces. Following closely upon the established popularity of the improvement came rival claimants for its control. Hitherto the representatives of the patents on which these claims were based have been warring against each other; but meanwhile other manufacturers and the trade at large have been looking on with painful uncertainty as to their own rights and liabilities—their anxiety in this regard being enhanced by the consideration that the patents owned by the contestants probably covered all the principal features of the anti-clinker construction, and that, as it was more than possible that the patents of both parties to the litigation might be adjudged valid and controlling, the trade was in serious danger of being called upon, after a lapse of years, to account for profits and damages to two different claimants.

The amicable termination of a long and costly litigation which has disturbed the trade for five years, is a matter for congratulation. To the trustees above named have been transferred not only all the conflicting anti-clinker patents, but also those design patents which have lately been in the courts. In the discharge of their duties as trustees these gentlemen will, we are sure, deal fairly with the trade. Their personal character and business standing give assurance that they will adopt a liberal policy which will give no pretext for factious opposition.

### Organizing the New York International Exhibition.

The Citizen's Committee on the proposed World's Fair, to be held in New York in 1883, met on Tuesday evening at the Union Square Hotel, Elwood E. Thorne, in the chair. The Committee on Site reported that its organization had been completed. Nine sites had been under consideration of the committee, but it had been thought advisable to await the complete organization of the General Committee before taking action in regard to any of them.

The Sub-Committee on Organization and Classification recommended first, that the proposed world's fair be held in the city of New York, in 1883; second, that it be held under the direction of one organization, to be created by act of Congress, consisting of commissioners from the different States and

Territories, and from the city of New York and other prominent cities of the United States, giving a sufficient number to this city to constitute an effective working executive committee; third, that this report be submitted to the National Convention called to meet in this city to-day (Thursday). The report was adopted and referred to the National Convention.

The Committee on Permanent Organization reported the following persons as permanent officers of the committee: president, H. G. Stebbins; vice-presidents, W. A. Cole, F. L. Talcott, P. J. Schneider, Elwood E. Thorne; treasurer, George W. Debevoise; financial and fiscal agents, Farmers' Loan and Trust Company; secretary, W. H. C. Price. These officers were elected.

A resolution was adopted instructing the chair, after the convention, to appoint a sub-committee on national legislation for the World's Fair, or to prepare a bill to be presented to Congress for the purposes of the fair. The committee is to meet Sept. 8. Charles Howard Williams, on behalf of the United States Board of Trade, extended an invitation to the members of the Citizens' Committee to attend as delegates the convention, meeting to-morrow at the St. Nicholas Hotel, at noon. The invitation was accepted.

The chairman stated that already 15 States, 18 cities, and 14 commercial organizations, representing in all 176 delegates, had intimated their intention of being represented at the convention. The meeting was then addressed by the Hon. B. A. Willis, Algernon S. Sullivan, John C. Wyman, and the Rev. Dr. Prime.

### Mexico—Her History, Position and Commercial Possibilities.

GALVESTON, TEXAS, June 5, 1879.

To the Editor of The Iron Age: Believing that very many readers of your valuable journal will feel an interest in knowing more about the great State of Texas, I send you a few facts in regard to it, and its importance in relation to the trade of Mexico. I am aware that few people in the United States have any great confidence in the value of trade with Mexico, but their indifference is largely the result of ignorance. For this reason an epitomized history of Mexico may be of advantage to the reader, in enabling him to comprehend the facts as they exist. We are all familiar with the struggles and trials of our forefathers in gaining independence, but the work of our thirteen colonies was, in comparison with Mexican independence, very simple and limited. An able writer says: "Where our troubles ended hers began. It took her fifty years to surmount them. Contrasted with hers, ours were trifles lighter than air. She had to emancipate herself from the complete system of political despotism and spiritual tyranny ever enforced upon a people in the sacred name of Christianity. The colossal structure had been the growth of three centuries of dense ignorance and besotted superstition. No such curse rested on us. We had no such incubus to throw off. Half her property, and three-fourths of her revenue, were owned by the church, and controlled by the priests; ours were all owned and controlled by the people. Civil was subordinated to ecclesiastical law. Liberty of conscience was unknown, and undreamed of. Little did it matter if the tyrant viceroy was expelled, so long as the soul-tyrant remained. What ricked it though new schools were established, so long as they were controlled by the Jesuits? That the Inquisition with its fiendish tortures was abolished, while the subtle machinery of the Confessionals was still in force? Which one of ten thousand ecclesiastics who stood guard over eight million souls, could be true to a Mexican Republic, without being false to monarchical Rome? Of all these millions, which one dared to die unshriven, and sleep like a dog in unconsecrated ground? What work would George Washington, Thomas Jefferson, John Adams and Charles Carroll have made of it, in planting the tree of liberty in such a soil? To judge justly of her rulers or her people, we must put ourselves in their place. We must look on Mexico with the sympathy of illumined republican statesmen, and not with the insatiable greed of filibusters."

In 1519, Cortez, the Spanish conqueror, planted the cross on the spot where Vera Cruz now stands. At that time the population of Mexico was about seven millions, their wealth incalculable and their freedom unfettered. With the conquest of Cortez the entire fabric of Mexican civilization changed. The will of the conqueror became the sole law. Subsequently, the old Spanish codes were taken as a model, and administered with every severity which the avarice, caprice, ambition or cruelty of the viceroy could desire or inflict. Whatever was just or good in the laws of Spain was omitted, and whatever was severe or inhuman was adopted. None of the milder and better laws of the natives were tolerated, and none of the tenderer souvenirs and precepts of a divine religion were allowed to be practiced. With the insignia of the majesty of Spain went the insignia of the Jesuit priest, and between the exactions of the conquerors and the exactions of the clergy, Mexico was made to yield her gold and silver, washed in the blood of her native inhabitants. Exhaustive taxes were levied upon every article that could possibly yield a revenue, and the whole country was a prey to the worst system of legalized robbery the world ever saw. The cruelties inflicted upon the natives were enough to freeze the blood, and many of them found relief from their misery and slavery only in death. Public schools were forbidden, and it was not until 1806 that a printing press was allowed in Mexico, and then only under the absolute control of the church and the government, and used chiefly to promulgate edicts to crush the people and exact revenue. For 300 years the people of Mexico were in bondage and under the heels of their conquerors.

In 1810 the creole (Mexican) priest Hidalgo proclaimed his insurrectionary struggle to free his brothers from their oppressors. This became the revolutionary struggle for independence. Hidalgo was captured and shot. He was succeeded, however, by his

lieutenant, Morelos, who continued the revolution with varying fortunes. On the 22nd of October, 1813, Mexico was formally declared independent of Spain. Still they were pursued and fought, and in 1820 the second revolution took place; in 1821 the third, and in 1824 a federal constitution was adopted, and General Victoria was duly inaugurated the first President of the new republic. In 1829, when the Republic was only 5 years old, slavery was forever abolished, which speaks volumes for the progress Mexico had made after achieving her independence. The next step was the abolition of church tithes. In 1834, Gomes Farias, one of the leaders of the reform party, proposed in Congress the confiscation of the church property. Santa Anna defeated the measure. In 1847 the reformers became strong enough in Congress to pass a law authorizing the sale or mortgage of church property to the extent of \$15,000,000, but Santa Anna, then at the head of the government, allowed the Congressional decree to become a dead letter. In 1854 Santa Anna became dictator by the grace of clerical dollars and bayonets, but finding no favor in foreign courts, his party weakened and the reformers regained strength. In 1855 the dictator was overthrown and fled the country. The first free Congress of Mexico assembled in the capital on the 18th of February, 1856, and in 1857 the Constitution proclaimed constitutional government, freedom of religion and education, liberty of the press, nationalization of church property, subordination of the military to the civil power, and the encouragement of immigration. For three years the reformers struggled with heroic endurance and unyielding valor. The clergy, however, did not stand idle, but worked secretly in foreign countries, and Europe pounced upon Mexico, before she had time to breathe. England from commercial greed, Napoleon from imperial ambition, and Spain from priestly domination, formed an alliance in 1861 and declared war against Mexico, in defiance of "the Monroe doctrine." In 1862 Maximilian was crowned Emperor; Juarez was then President. Then came four years more of unsurpassed struggles for liberty against fearful odds. Diaz, who had so long defended Oaxaca, was forced to surrender, with his garrison, as prisoner of war. With him fell the last stronghold of the patriots. Mexico seemed given over to Maximilian, who, thinking Juarez had fled to the United States, issued a decree that "all prisoners taken in arms against the sovereign authority of Mexico will be shot." This edict inflamed the hatred of all classes. Diaz escaped from his prison and recaptured Oaxaca, and by September, 1866, Juarez had reclaimed all the Northern States of Mexico. The fate of Maximilian's empire was sealed in 1867. Juarez remained President until his death, in July, 1872. Lerdo, then Vice-President, succeeded legally to the vacant place. He attempted to become Dictator by opposing an election for President in 1876, when the grand issue was made and Gen. Diaz was elected President. This is termed the last revolution. When Gen. Diaz was regularly installed in the National Palace he found an empty treasury. The mixed commission on American claims had awarded to our claimants \$4,000,000, and the first installment of \$300,000 must be paid at once. Something must be done. He sent for some of the leading merchants and bankers and asked them for help, offering them preferred government bonds. "No, General," they said, "that is no security. Give us your personal word, and you can have the money." "Gentlemen," he replied, "I am a poor man." "No matter, your word is sufficient." The money, \$500,000, was forthcoming and was refunded in four months, all saved by economy.

The policy of the Diaz administration briefly summed up is—

1. Indisputable qualifications for office, with the strictest personal accountability.
2. Inflexible and prompt execution of the laws and inviolability of the Constitution, with the adoption of the amendment prohibiting a re-election to the presidency.
3. Honest collection of the public revenue from every source, and the account of its expenditure to the last dollar.
4. Thorough revenue reform.
5. The suppression of brigandage and violence throughout the republic.
6. Security for life and property.
7. Promotion of railways, telegraphs, agriculture, mining, manufactures and the useful arts.
8. Popular education and the advancement of science.
9. The establishment of the public credit.
10. More intimate commercial relations with foreign countries, especially with the United States.

These are the principles advocated by the Diaz government, or the administration of the people of Mexico. Have they met at the hands of the United States government the recognition they deserve? For the past two years a joint resolution has been pending before both houses of our Congress to establish closer commercial relations with Mexico, but what has been the result? No action whatever. And why? Is it because the Mexican people have been revolutionary? We, above all, should be the last people in the world to reproach Mexico for her revolutionary struggles. Every new one has given her a fresh claim to our regard and sympathy. An able writer says of the Mexican convulsions: "Sunk in the deep waters, she could rise to catch breath only in the throes of revolution—that sacred ring which blessed thing—that signet ring which the Almighty put on the finger of John Hancock—which was worn by Hidalgo, Juarez and Diaz—which finds no mean significance in the curled form of the trodden worm; all through the living universe it is the spirit of God; his creature is forever looking up to the Father—it is the inspiration of hope and the pledge of triumph." The man who speaks lightly of revolution, speaks lightly of human advancement—of the future of the race. No. It is more likely that the priesthood are at work in our legislative halls obstructing measures favorable to Mexico. The reader may say that the Mexican Congress is opposed to commercial treaties with the United States, and that it but recently opposed granting aid to an industrial exposition

which was to be held early next year. The reasons are obvious. The parasites that are at work in that body are the English and German merchants, who know full well that the result of such an exposition would be the loss to them of the entire trade of Mexico. To that element, and that alone, may be attributed the failure, if failure it be, of the proposed Mexican exposition of 1880.

Is the Mexican trade worth cultivating? There are in Mexico at the present time over 10,000,000 people, who trade with the United States only to the extent of 52 cents per capita. English, French and German merchants can be counted there by the thousand, and of American traders not a corporal's guard. A few of our adventurous tradesmen have taken goods into Mexico without inspecting their markets or consulting the tastes of the Mexican people. The result has been a failure, of course. Others who have shipped goods there have found transportation too high. In taking goods into the interior, where the principal cities and principal trade are found, original packages must be broken, in order to pack the merchandise upon mules, this being the only means of transportation. In accomplishing this, the merchant is subjected to much inconvenience. No more, however—and perhaps not so much—as he would be in New York or Philadelphia, where he is obliged to receive his goods on the wharves without shelter, break the packages, and put the goods on mules for transportation, as they do in Mexico. The chances are that he would have more goods stolen in New York or Philadelphia than in Mexico. There is a general impression that life and property are insecure in Mexico; that the country is unsettled; that the government is like that of savages on the plains. Such is not the fact. The selfish power that creates this distrust and advances these unfounded assertions is the English and German merchant, who monopolize the trade of Mexico. There is a trade in Mexico—an immense trade—that, with proper facilities for transportation, would be almost beyond comprehension. A writer says: "At what shall one estimate the trade with Mexico, when it is considered that, to the greatest portion of their ten million inhabitants, the ax, the wheelbarrow, the clock, the sewing machine, and the tens of thousands of common articles in use by us daily, are unknown." It is a matter of national importance that communication by rail should be established between the United States and Mexico. It would knock all idea of a war with Mexico out of the head of every filibuster and demagogue on both sides of the line, and inaugurate the surest, safest and most practical method of securing and controlling her valuable trade. We purchase from the West Indies and South America sugar and molasses to the extent of \$81,000,000 annually, and sustain a loss in gold and silver of \$62,000,000 annually, that being the balance of trade against us on these articles alone, when Mexico could supply our demands for them to the fullest extent, and would gladly take in exchange our goods and wares. In our demands for coffee Mexico is capable of supplying all our wants, and to her we would not be compelled to pay an export duty, as we now do to Brazil, to the extent of 13 per cent. The fruits now purchased by us from the Mediterranean, the hides and wool from Australia, the hemp and other fibers from India, are all indigenous to Mexican soil, and could be supplied by her to the full measure of the demand, had we but facilities for intercommunication one with the other. Railroads are the only means by which that trade can be secured and developed. The railroads centering at Galveston or Houston, Texas, make those cities the nearest competing points for Mexican freights. Rio Grande City, opposite Camargo, Mexico, is the nearest point to the populated portion of Mexico to which a railroad could be built upon our own soil, as 95.37 per cent. of the inhabitants of that republic live south of that point. Should a railroad be constructed from Galveston to Camargo, as now contemplated, it would pass through one of the finest agricultural countries in the world. On no portion of the globe has there yet been found such a depth of rich soil as is found on the Brazos and old Caney. For 200 miles of the 352 miles between Galveston and Camargo are found, in beautiful plateaus from 40 to 60 feet above the ordinary stage of water in the rivers which pass through them, these rich lands timbered with live oak. Between the Nueces and Rio Grande are found those nutritious grasses upon which millions of head of cattle grazed previous to the raids of the border brigands, all of which will be reclaimed by the construction of this road. From Camargo the road would soon be extended through the San Juan Pass to Monterey, the initial point for trade with Mexico. From this point to all parts of Mexico railroads would be constructed, so soon as the people of that republic found that railroads develop instead of drive away trade. Other railroads are projected into the northern part of Mexico, where a rich mineral and agricultural country will be found, and where machinery of all kinds will be needed. The merchants and manufacturers who patronize your advertising columns so liberally should study well the "Mexican question," and do all in their power to encourage the extension of our railway system into that country, and memorialize Congress to pass a joint resolution requesting the President to establish closer and more amicable relations with our sister republic.

Very truly yours, M. B. J.

### Civil Engineers' Convention.

CLEVELAND, OHIO, June 17, 1879.

The American Society of Civil Engineers met here to-day in annual convention. About 200 members are present from different sections of the country, including Col. Merrill, of the army; Mr. Chesbrough, of Chicago; Col. Hardee, of New Orleans; Mr. Collingwood, of the East River Bridge, of New York; Gen. Ellis, of Hartford; Mr. Emery, of the naval revenue service, and many other gentlemen highly distinguished in their profession.







## Trade Report.

Office of The Iron Age,  
WEDNESDAY EVENING, June 19, 1879.

The financial markets have been quiet during the past week, and at the close of business to-day are without feature of general interest. The money market has been firm and quiet, with call loans at 2 1/2 per cent. on government bonds, and 3 1/4 per cent. on miscellaneous collateral. Prime business paper is 3 1/4 @ 5 per cent.

The market for government bonds has been active, with a large and continuous investment demand, chiefly for 4 per cents. Railway mortgages are buoyant. We give below the closing quotations of governments.

In the stock market the transactions have indicated buoyancy, which lasted until prices declined under a sharp bear raid. The early advances were most marked in the coal stocks, the so-called Granger stocks and Lake Shore. Since the break in prices the market has been very quiet, with little tendency to speculation manifested. We give below the closing quotations of active shares.

The bank return shows an increase of \$1,724,950 in surplus reserve, which now stands at \$6,803,625, against \$5,161,800 at this time last year, and \$19,049,250 at the corresponding period in 1877. The loans show a decrease this week of \$2,041,700; the specie is down \$215,800; the legal tenders are increased \$2,029,100; the deposits other than United States are augmented \$353,400 and the circulation is up \$79,000.

The following is an analysis of the bank totals of this week compared with that of last week:

	June 7.	June 14.	Comparisons.
Loans.....	\$258,332,700	\$256,291,000	Dec. \$2,041,700
Specie.....	18,095,700	18,785,900	Dec. 215,800
Legal tenders.....	44,822,800	44,811,900	Inc. 1,000
Total reserve.....	61,819,300	63,622,800	Inc. 1,803,500
Deposits.....	226,653,300	227,316,700	Inc. 353,400
Reserve required.....	56,740,825	56,809,175	Inc. 88,350
Surplus.....	5,078,475	6,803,625	Inc. 1,724,950
Circulation.....	19,977,900	20,056,900	Inc. 79,000

The foreign trade movements at the port of New York since our last issue are shown in the following tables:

## IMPORTS.

For the week ended June 14:

	1877.	1878.	1879.
Dry goods.....	\$777,492	\$769,200	\$804,324
General mds.....	7,230,418	5,512,876	5,278,252
Total for week.....	\$8,007,910	\$6,282,076	\$6,172,576
Prev. reported.....	148,482,479	127,195,384	137,570,113

Since Jan. 1.....\$156,780,389 \$133,477,460 \$143,742,691

Included in the imports were items of merchandise valued as follows:

	Quantity.	Value.
Anvils.....	40	\$350
Brass goods.....	2	1,288
Bronzes.....	2	2,068
Cutlery.....	43	13,600
Guns.....	58	8,777
Hardware.....	34	654
Iron, pig, tons.....	2,378	6,579
Iron, sheet, tons.....	24	2,178
Railroad bars, tons.....	3,088	22,519
Iron, other, tons.....	3,116	7,033
Iron, other, tons.....	47	99,363
Metal goods.....	12	2,509
Nails.....	12	4,159
Needles.....	12	9,643
Old metal.....	2	2,196
Platina.....	2	2,196
Perforated caps.....	23	2,140
Saddlery.....	12	2,399
Steel.....	12	18,405
Silverware.....	2	2,397
Silver ore.....	12	523
Tin, bxs.....	2	232,863
Tin, 1,500 slabs.....	6,227	8,529
Wire.....	103	5,499
Zinc.....	12	5,537

## EXPORTS, EXCLUSIVE OF SPECIE.

For week ended June 17:

	1877.	1878.	1879.
For the week.....	\$4,820,173	\$6,232,760	\$6,315,753
Prev. reported.....	118,975,091	121,185,266	138,828,438

Since Jan. 1.....\$123,705,264 \$128,438,025 \$145,144,191

## EXPORTS OF SPECIE.

For the week ended June 14:

	1877.	1878.	1879.
Total for the week.....	\$1,016,105		
Previously reported.....	9,748,955		

Total since January 1, 1879.....\$10,765,060

Government bonds closed firm as follows:

	Bid.	Asked.
U. S. Currency 6's.....	122	126
U. S. 6's 1880 registered.....	104 1/2	104 1/2
U. S. 6's 1880 coupon.....	103 1/2	103 1/2
U. S. 6's 1881 registered.....	103 1/2	103 1/2
U. S. 6's 1881 coupon.....	103 1/2	103 1/2
U. S. 5's 1881 registered.....	103 1/2	103 1/2
U. S. 5's 1881 coupon.....	103 1/2	103 1/2
U. S. 4's 1881 registered.....	103 1/2	103 1/2
U. S. 4's 1881 coupon.....	103 1/2	103 1/2
U. S. 4's 1882 registered.....	103 1/2	103 1/2
U. S. 4's 1882 coupon.....	103 1/2	103 1/2

The following are the closing quotations of active shares:

	Bid.	Asked.
American District Telegraph.....	69	69 1/2
Atlantic and Pacific Telegraph.....	36 1/2	36 1/2
Burlington and Quincy.....	113 1/2	113 1/2
Bur. Cedar Rapids & North.....	38 1/2	38 1/2
Canada Southern.....	56	57 1/2
Canton.....	40	40 1/2
Col. Chicago and Indiana Central.....	69 1/2	69 1/2
Clev. Col. Cin. and Indianapolis.....	49 1/2	49 1/2
Cleveland and Pittsburgh.....	60 1/2	60 1/2
Delaware and Hudson Canal.....	46 1/2	46 1/2
Delaware, Lack. and Western.....	57 1/2	57 1/2
Express-Adams.....	105 1/2	105 1/2
" American.....	47 1/2	47 1/2
" Wells, Fargo & Co.....	99 1/2	99 1/2
Erie.....	97 1/2	97 1/2
" Pref.....	37 1/2	37 1/2
Harlem.....	158	158 1/2
Hannibal and St. Joseph.....	20 1/2	20 1/2
Homestead.....	82 1/2	82 1/2
Illinois Central.....	86 1/2	86 1/2
Kansas Pacific.....	55 1/2	55 1/2
Kansas and Texas.....	12 1/2	12 1/2
Lake Shore.....	74 1/2	74 1/2
Louisville and Nashville.....	29 1/2	29 1/2
Michigan Central.....	75 1/2	75 1/2
Morris and Essex.....	77 1/2	77 1/2

New York Central.....	117 1/2	118
" Elevated.....	130	131
New Jersey Central.....	32 1/2	32 1/2
Northwestern.....	95 1/2	95 1/2
" Pref.....	95 1/2	95 1/2
Ohio and Mississippi.....	14 1/2	14 1/2
Pacific Mail.....	34	34
Panama.....	15 1/2	15 1/2
Quicksilver.....	149	149
" Pref.....	158 1/2	158 1/2
Rock Island and Pacific.....	138 1/2	139
St. Louis and Iron Mountain.....	23 1/2	23 1/2
St. Louis Kansas City Northern.....	13 1/2	13 1/2
" Pref.....	30 1/2	30 1/2
St. Louis and San Francisco.....	7 1/2	8 1/2
St. Paul.....	9	9 1/2
" Pref.....	53 1/2	53 1/2
Standard.....	29 1/2	29 1/2
Sutro Tunnel.....	29 1/2	29 1/2
Union Pacific.....	4 1/2	4 1/2
Wabash.....	7 1/2	7 1/2
Western Union Telegraph.....	115 1/2	115 1/2

## GENERAL HARDWARE.

The condition of business is unchanged since our last writing, the demand keeping up notwithstanding the lateness of the season.

An effort is being made looking toward a general suspension of business in the hardware and metal trades on Saturday, July 5, thereby giving the employees an uninterrupted vacation from Thursday evening, July 3, to Monday morning, July 7. At the close of business to-day about 20 establishments had signed a paper agreeing to close their places of business on the 5th as well as the 4th, and many others have signified their willingness to add their names as soon as the paper is presented. Saturday being a short day at best, it is fully expected that sufficient signatures will be obtained to insure the success of the project.

At a meeting of Strap and T-Hinge Manufacturers, held at Niagara Falls, N. Y., on the 11th inst., it was voted that prices of Hinges remain unchanged.

The following circular shows the action taken by the Pump Manufacturers at their late meeting:

## PUMP MANUFACTURERS' CIRCULAR.

Office of W. & B. DOUGLAS,  
MIDDLETOWN, CONN., June 12, 1879.

At a meeting of the Pump Manufacturers' Association of the United States, held at Saratoga Springs, N. Y., June 10, 1879, the following prices were unanimously adopted:

	Discounts per cent.
Cistern and Pitcher Pumps.....	40
Drive Well, Yard and Set Length Lift Pumps.....	45
Iron and Brass Cylinder Force Pumps, Single or Double Acting for hand use, Set Length Force Pumps, Brass Cylinder Cistern and Pitcher Pumps, and Hand Boiler Pumps.....	35
Hydraulic Rams.....	35
Garden Engines.....	25

Respectfully soliciting your orders, we remain, very truly yours,

W. &amp; B. DOUGLAS.

It will be seen by the following circular that the plant, &c., of the Hart, Bliven & Mead Mfg. Co., at Kensington, Conn., has been purchased by the Peck, Stow & Wilcox Co., who will hereafter manufacture their full line of goods. Mr. Mead, the receiver of the Hart, Bliven & Mead Mfg. Co. in this city, will continue the sale of the goods of the company until the stock in store is closed out:

## Office of THE PECK, STOW &amp; WILCOX CO.,

SOUTHERN BRANCH,  
AND 43 CHAMBERS STREET, NEW YORK.

Having purchased the real estate, tools and machinery, patterns and finished merchandise of the Hart, Bliven & Mead Mfg. Co., at Kensington, Conn., we shall continue to manufacture the entire line of goods made by that firm, and respectfully solicit your orders for the same.

The manufacture of these goods will remain under the same skillful management as heretofore, and the former reputation of this firm will be fully maintained.

We desire especially to call your attention to Edge Tools and Stationers' Hardware, a full and complete assortment of which we shall have constantly on hand. We remain, most respectfully yours,

THE PECK, STOW &amp; WILCOX CO.

NEW YORK, June 11, 1879.

The American Spring Spring Butt Company (Van Wagoner & Williams) illustrate, in their advertisement on the last page, their new Spring Hinge for Screen Doors, which they call the "Gem." They claim it to be very simple in its construction, and well adapted for all kinds of screen doors, besides being the cheapest adjustable Spring Hinge in the market. The prices are 75 cents per pair for Single Acting and \$1.50 per pair for Double Acting. Discount to the hardware trade, 20 per cent.

There is very little doing in Nails this week, and although no change in price is reported, the tone of the market is not as strong as at our last writing. We continue to quote rod to 60d \$2.25, net.

Henry B. Newhall, No. 11 Warren street, has issued a conveniently arranged and handsomely illustrated catalogue and price list of goods manufactured by the Providence Tool Company; Hubbard, Bakewell & Co.; W. P. Townsend & Co.; Pittsburgh Hinge Co.; Klein, Logan & Co.; Standard Nut Co.; Wm. H. Haskell & Co., and Penfield Block Works, for whom he is agent. Among the goods illustrated are a good line of Nuts, Washers and Burrs, Machine and Plow Bolts, Coach and Lag Screws, Set Screws and Tap Bolts, Machine Screws, Carriage Bolts, Plate and Strap and T-Hinges, Files, Threshing Machine Teeth, Rivets, Differential Pulleys, boat and sail-makers' goods, Tackle Blocks and Sheaves, Picks, Mattocks, Grub Hoes and kindred goods, Hammers, Hatchets, Axes, &c., Circular, Mill and Cross-Cut Saws, and a handsome line of Shovels, Spades and Scoops, including the Corrugated Strap Scoop recently described in our columns. The book contains 269 pages, and is furnished with a very comprehensive index. It is printed on heavy, tinted paper, and substantially bound in cloth.

## IRON.

The demand for Pig Iron is remarkably active considering the lateness of the season, and prices are firm and unchanged. We hear of sales during the week of 2200 tons Gray Forge and No. 2 X, on private terms, and 1000 tons Nos. 2 and 2 X, Thomas at \$16 and \$17.25. We quote Foundry No. 1, \$18.50 @ \$19; Foundry No. 2, \$17 @ \$18, and Gray Forge, \$16.50.

Scotch Pig.—The business in Scotch Iron, with the exception of a sale of 300 tons Glen-garnock on private terms, has been only of a retail nature. We hear of the arrival of 300 tons assorted brands. Quotations are as follows: Eglinton, \$19 @ \$19.50; Coltness, \$22; Glen-garnock, \$20.

Rails.—The inquiry for Steel Rails continues active, and it is expected that some large orders for late deliveries will be placed at an early day. We hear of a sale of 1100 tons Steel Rails, August and September delivery, at \$46 at mill. It is expected that purchasers of Rails for next year's delivery will, owing to the difficulties they have experienced in obtaining supplies on short notice, enter the market earlier than has been their custom. We quote Steel at tidewater, \$45 @ \$47. In Iron Rails no transactions are reported, and quotations are unchanged, viz., \$37 @ \$39, at mill.

Old Rails.—A sale of 500 tons at \$22 here is reported; there is also a rumor of an order being placed for importation of 5000 tons. We continue to quote \$21.50 @ \$23 here.

Scrap.—The market is quiet, the only sale we hear of being 350 tons Wrought on private terms. We quote the same from yard, \$23 @ \$24.

## METALS.

Copper.—The market here is devoid of interest, sales during the week having been limited to 50,000 pounds Lake Superior at 16 1/2¢ @ 16 3/4¢, which is the closing figure and also the nominal value of Baltimore. There is nothing new per cable from England, but we receive the following per mail from there, dated London, June 7: "Chili bars showed little change during the first fortnight of May, and transactions were unimportant, at about £58. 15/ for g. o. b's. The supplies outside of Chilean production, more especially of Spanish precipitate, form a factor of increasing importance. The heavy shipments from the coast of Chili, probably for security's sake during the war with Peru, have produced very unfavorable statistics, but so far prices have not given way more than 10/ per ton, though the cost of bars to lay down in Liverpool does not now exceed £55 per ton by the last advice to the 30th ult. at Valparaiso. The Indian demand for manufactured has been considerable. The charters of copper produce advised by cablegram from Valparaiso represent 5700 tons in fine copper for the month of May." Telegrams have reached us since from the West Coast, according to which there are indications that Chili will soon have the undisputed maritime command of the entire coast, unless the Argentine Republic embraces the cause of Chili's antagonists. There was some apprehension that this would be the case, and the immediate future is quite doubtful. There is no change in the combination prices of manufactured copper. We quote: New Sheathing Copper, 22¢; Braziers', 24¢, and Bolts, 24¢; Bottoms, 26¢; American Yellow Sheathing Metal, 13 1/2¢; Yellow Metal Bolts, 20¢, and English Yellow Sheathing Metal, 12¢ @ 12 1/2¢, in bond.

Tin.—Since our last report prices have further improved, and we quote at the close. Straits on the spot, 15 1/4¢ @ 15 3/4¢; English Common, 15¢, and Banca, 18¢, all large lines. Some 150 tons Straits sold during the week at 15 1/4¢. The arrivals have been 1024 slabs Straits, sold previous to arrival. The shipments from Singapore during the first half of June have been 200 tons to the United States and 200 tons to England. The statistical position in Europe on the 1st instant shows a decrease of 700 tons in the visible supply since May 1. London is called firm at £67 for Straits Tin and Singapore \$20 per picul, with an exchange of 3/11¢. They write from London June 7: "Prices of fine foreign fell from 68/6 to 66/, and fluctuated but slightly until the approach of the Dutch sale, when 66/9 was temporarily the quotation, after which the price receded to 66/. The market is slightly firmer at the close, and if the deliveries represent consumption, the shipments from Australia and the East are not excessive. There have, however, been several important discrepancies between recent cable advices and the actual shipments (and also between the different advices themselves), all pointing to an excess of shipments over estimates. The May shipments are estimated at 250 tons from the Straits and 620 tons from Australia." Tin Plates continue fairly active and cable advices from Europe strong. We quote: Charcoal Bright, per box, ordinary brands, large lines, \$5.87 1/2 @ \$6.25; ditto Terne, \$5.62 1/2 @ \$5.87 1/2; Coke Tin, \$5.12 1/2, and ditto Terne, \$4.87 1/2 @ \$5.

Lead.—There have been sold in a jobbing way during the week probably some 500 tons of lead at 3 1/4¢, at which holders remain quite firm. In Refined but a moderate business is doing at 3.85¢ @ 3.90¢. Manufacturers have raised Pipe Lead to 5¢, and Sheet to 6¢. After a decline of 5/ in May, the English market was still easy at £13. 12/6 @ £13. 15/ on June 7 for English Pig.

Spelter and Zinc.—The market has remained very quiet and featureless at 4 1/4¢ @ 4 1/2¢ for Common Domestic Spelter; Refined, 8¢ @ 8 1/4¢; Silesian, 5 1/4¢ @ 5 1/2¢, and Bergeport, from Lehigh Ore, 9¢. London remained dull on June 7 at £14. 10/ for Silesian. We quote American Sheet Zinc at New York, 6 1/4¢.

Nickel.—Remains moderately inquired for and steady at \$1.25 per pound for American.

Antimony.—The current consumptive demand is supplied at steady prices within the range of 11 1/4¢ @ 12 1/4¢, as to quantity and brand.

## EXPORTS.

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending June 12, 1879:

	Quan. Value.
Glasware, cs.....	\$170
Hdw., cs.....	189
Knit'g ma., cs.....	5,200
Pop'n, gals.....	670
Plid. ware, cs.....	103
Wire, reels.....	10
Nails, kegs.....	25
Dutch West Indies.....	
Ag. imp., pkgs.....	18
Nails, kegs.....	1
Mt. iron, pkgs.....	1
Pop'n, gals.....	3,987
Hdw., cs.....	49
Hamburg.....	
Hdw., cs.....	68
Gas fixt., cs.....	4
Belting, cs.....	8
Knit'g ma., cs.....	10
Tinware, cs.....	2
Cutlery, case.....	2
Sew. mach., cs.....	1
Pumps, pkgs.....	2
Slates, tons.....	120
Slates, cs.....	360
Plid. ware, cs.....	253
Mach'y, cs.....	58
Copper, cks.....	98
Mt. iron, pkgs.....	30
Dutch East Indies.....	
Pop'n, gals.....	37,625
Belting, cs.....	1

Stettin.....

Pop'n, gals.....	77,140	14,648
Belting, cs.....	26,790	
Mt. iron, pkgs.....	1,004	
Pop'n, gals.....	1,004	
Pumps, pkgs.....	1,161	
Carbon, bbls.....	25	
Ag. imp., pkgs.....	101	
Type, case.....	1	
Cop. o'ler, cs.....	1	
Belting, bales.....	6	

Pop'n, gals.....	3,987	
Belting, cs.....	1	
Pop'n, gals.....	3,987	
Belting, cs.....	1	

British North America.....

Pop'n, gals.....	77,140	14,648
Belting, cs.....	26,790	
Mt. iron, pkgs.....	1,004	
Pop'n, gals.....	1,004	
Pumps, pkgs.....	1,161	
Carbon, bbls.....	25	
Ag. imp., pkgs.....	101	
Type, case.....	1	
Cop. o'ler, cs.....	1	
Belting, bales.....	6	

British West Indies.....

Pop'n, gals.....	37,625	
Belting, cs.....	1	
Pop'n, gals.....	37,625	
Belting, cs.....	1	

British Honduras.....

Pop'n, gals.....	37,625	
Belting, cs.....	1	
Pop'n, gals.....	37,625	
Belting, cs.....	1	

New Zealand.....

Pop'n, gals.....	37,625	
Belting, cs.....	1	
Pop'n, gals.....	37,625	
Belting, cs.....	1	

United States of Colombia.....

Pop'n, gals.....	37,625
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Yellow Metal.....	100	100
Brass, heavy.....	100	100
Composition, heavy.....	100	100
Lead, solid.....	100	100
Tea Lead.....	100	100
Zinc.....	100	100
Pewter, No. 1.....	100	100
Wrought Iron.....	100	100
Stove Plate.....	100	100
Machinery do.....	100	100
Grate Bars.....	100	100

The prices current for Rags, &c., are as follows:

Canvas, Linen.....	100	100
White Cotton, New.....	100	100
White, No. 1.....	100	100
Soft, do.....	100	100
Mixed, Woolen.....	100	100
Mixed Rags.....	100	100
Gunny bagging.....	100	100
Book Stock.....	100	100
Newspapers.....	100	100
Waste Paper and Scrap.....	100	100
Kentucky Bale Rope.....	100	100
Tarred Shaking.....	100	100
Grass Rope.....	100	100

Messrs. Du Plaine & Co., Philadelphia, under date of June 17, quote the market prices for Old Metals as follows:

Heavy Old Copper.....	100	100
Light Tinned Copper.....	100	100
Copper Bottoms.....	100	100
Heavy Red Brass Scrap.....	100	100
Light Red Brass Scrap.....	100	100
Heavy Yellow Brass Scrap.....	100	100
Light Yellow Brass Scrap.....	100	100
Old Lead Pipe.....	100	100
Tea Lead.....	100	100
New Zinc Clippings.....	100	100
Old Scrap Zinc.....	100	100
Old Battery Zinc.....	100	100
Plumbers' Lead Joints.....	100	100
No. 1 Pewter.....	100	100
Old Type Metal.....	100	100
Red Brass Turnings.....	100	100
Yellow Brass Turnings.....	100	100
Spelter Dross.....	100	100
Lead Dross.....	100	100
Stereotype or Electrotype Plates.....	100	100

### PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., Philadelphia, June 17, 1879.

**Pig Iron.**—The market shows no change of feature, and transactions during the week, so far as we can learn, have all been at about regular quotations. There is less inquiry, which at this season is nearly without being at all weak. The furnaces are well sold up, and as the indications for the fall trade are very favorable, there is no apparent anxiety to push business reaching to the future. As a rule, business is considered to be in a healthy and satisfactory condition, and complaints are seldom heard either from buyer or seller. Once in a while fears are expressed of an over-production, but the fact of stocks being steadily-increasing consumption, will no doubt prevent disproportionate supplies. The outlook in regard to business generally seems to warrant expectations of further improvement during the fall and winter months, so that a gradually increasing production of pig metal appears to be quite in keeping with the times. In point of fact, trade believe such a course to be quite desirable, as it will tend to check speculation, prevent too sudden advance in prices, and also prevent heavy importations of foreign iron. A steady market seems to be desired by the leading operators, and at present it seems to be well under control. White and mottled irons have been taken off the market, but consumers seem to have no alternative but to go direct to the producer, a feature of the trade which has not been known for some years past. We quote: White and Mottled, \$13 @ \$14; Gray Forge, \$15 @ \$16; No. 2 Foundry, \$15.50, and No. 1 Foundry, \$17 @ \$18, all at furnace; market steady.

**Blooms.**—The market is quiet, and prices are inclined to drop a little. Sales in a small way are reported at quotations, but for large lots concessions have to be made in order to secure business. We quote Sunken Ore Blooms (24 lb), \$38 @ \$39; Northern Ore Blooms (22 lb), \$33 @ \$37; best quality Charcoal Billets (22 lb), for wire and steel purposes, \$58 @ \$60; Bars do, \$62.50 @ \$65; Sheet Iron Blooms, cornered (24 lb), \$53 @ \$55; Cold-blast Charcoal Plate Blooms, \$50 @ \$53; run-out Anthracite, \$45 @ \$47.50.

**Muck Bar.**—The market is steady, and with a good demand, sellers are firm. Sales have been made at \$30 @ \$30.50, at mill, but there is a disposition to hold for higher prices. We quote \$30 @ \$31.50 at mill, as the extreme figures.

**Structural Iron.**—We cannot report very heavy transactions, but there is a steady demand for small lots, which keeps the mills actively employed, so that prices advance in the near future. The outlook command during the fall seem to be assured. We quote same as last week, at which entered: Angles, 2 1/2 @ 2 3/4; Tees, 2 3/4 @ 2 1/2; Beams and Channels, 2 5/8 @ 2 7/8, according to specification.

**Plate and Tank Iron.**—The demand continues brisk, and the majority of the shade firmer on the lower grades, but we hear that lower figures have been accepted of the market, however, seems to be toward higher figures, and an advance on all delivery short time. Skelp is still in active demand, and transactions are of frequent occurrence. Holders are firmer in their prices, although we quote same as last week: Skelp, 1.0 @ 2.0; Sheared ditto, 2.0 @ 2.5; Common Plates, 2.0 @ 2.5; Tank Iron, 2.0 @ 2.4; C. No. 1, 2.4 @ 2.5; Shell Iron, 2.75 @ 2.9; Flange Iron, 2.4 @ 4.0; Solid Firebox, 4.85 @ 5.0, and Sheet Iron, 5.5 @ 6.0.

**Sheet Iron.**—The past week shows fair improvement in the demand for sheet iron, and although prices are not notably higher, holders are firm and appear to expect an advance very soon. The prospects seem to indicate a much heavier demand gradually increasing, manufacturers are not so eager to place their products for small lots as follows: Common Sheet, No. 20 to 23, 3.2 @ 3.3; No. 24 to 25, 3.4 @ 3.5; Best Refined Sheet; No. 24 to 25, 3.5 @ 3.6; No. 16 to 24, 3.4 @ 3.5; Best Bloom Sheets, No. 16 to 24, 5.5 @ 5.7; No. 25 to 28, 5.8 @ 6.0; Refined Plates or Blue Annealed, 5-16 to 16, 2.6 @ 2.7; Best Bloom, 5-16 to 16, 5.3 @ 5.5; A Patent Planished, 10 1/2 @ 10.5; B Patent Planished, 9 1/2 @ 9.5; Best Blooms Galvanized, 45 % discount; second quality, 55 %; extra discounts for large lots.

**Bar Iron.**—There is no change to note in this department; the demand is satisfactory for the manufacturer. The amount of business done so far this year appears to be exceeding greater than during two or three preceding seasons, and prospects are quite encouraging for the balance of the year. The increased cost of material and other items prevents manufacturers from obtaining much advantage from the higher prices, so that business is unremunerative. With a steadily increasing demand, however, it is not likely that manufacturers will continue doing business at unprofitable figures. In the meantime we quote same as last week, 1.8 @ 2.0, according to quality.

**Steel Rails.**—We have no information of a large business in this vicinity, although the leading firms in the East appear to be full of orders, and are not soliciting business at mill is about the rate at which business is being done, but even at these figures it is difficult to place orders of any amount.

**Iron Rails.**—There is no falling off in the demand, but owing to the difficulty of placing orders, very little business has been done during the past week. The demand for early delivery is especially active, but the mills appear to be nearly all full for three months and longer, so that new business of other mills being prepared for active operations, and these will no doubt accept fill them. The scarcity of old rails and low priced material generally is a serious drawback, however, and there are strong indications that the demand for some time will be greater than the capacity for production. There is some diversity of opinion as to prices, but we know of large sales at \$37 @ \$37.50, at mill, for 56s, and have no doubt that our quotations have been a fair average of the market. Lower prices have been mentioned, but we cannot trace any recent transactions at less than \$37, with the market very firm at \$36.50 @ \$38, at mill, according to location, section of rail, &c.

**Spikes.**—5 1/2 x 9-16, 2 1/2 @ 2 3/4; 1/2 x 4 and 3/4 x 3 and longer, 3 @ 3 1/2. Market active and prices firm.

**Nails.**—The market is irregular, and sales cannot be made in quantity at over \$2.15, although \$2.25 is the nominal rate. It is claimed that inferior and heavy West-ern nails have been offered at low rates, which has unsettled prices of standard brands.

**Scrap Iron.**—Is very firm, and sales are easily made at top figures—say, \$14 @ \$15.50 for Cast, and \$23.50 @ \$24.50 for Wrought.

**Old Rails.**—Supplies for immediate delivery appear to be as scarce as ever, and sold, a day or two since, at \$23.25, and we have heard of another transaction to-day at a still higher figure.

**Steel.**—The market is irregular, and sales cannot be made in quantity at over \$2.15, although \$2.25 is the nominal rate. It is claimed that inferior and heavy West-ern nails have been offered at low rates, which has unsettled prices of standard brands.

**Scrap Iron.**—Is very firm, and sales are easily made at top figures—say, \$14 @ \$15.50 for Cast, and \$23.50 @ \$24.50 for Wrought.

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### CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., Chattanooga, June 16, 1879.

We have had a cool week, with copious showers of rain. Crops generally are in a prosperous condition, and prices for all kinds of produce are therefore moderate and have slightly improved. In some lines business is better, very much better, than usual this season. Stocks generally are sold low, and in a few instances orders have been refused on account of pressure of bills already booked. One furnace in the district will work on steel pig the balance of the year.

**Pig Iron.**—Trade is fairly active, with no change in prices. The Western and Northern demands are brisk. One furnace is shipping an average of about 50 tons of supply is fairly full of all grades, but the increase of stock. The interest in new furnace enterprises continues, with a prospect of the end of 1880 the product of the general much improved. We quote: Coke 2, \$16 @ \$17; Gray Forge, \$14 @ \$15; No. 1 Foundry, extra, \$20 @ \$21; ditto, \$18 @ \$19; No. 2 Foundry, \$16 @ \$17; Gray Forge, \$16 @ \$18; White and Mottled, \$15. Cold blast Charcoal—Car Wheel Metal, \$22.50 @ \$23.50; ditto, Extra Standard, \$24 @ \$29.50; Forged, \$17 @ \$22.

**Muck Bar, &c.**—\$27 @ \$34; Old Rails, \$19 @ \$20; Wrought Scrap, \$20 @ \$21. Old rails and wrought scrap have been advancing slowly for some time, and the advance has been sharp in both articles during the week.

**Ores.**—Brown Hematite, 50 to 56 %; per ton, \$1.75 @ \$2.25. Red Fossiliferous, 50 %; per ton, \$1.20 @ \$1.60. The above prices for ores delivered in Chattanooga on cars, or on the wharf from flat boats.

**Nails.**—The market at present rates is without special feature, except a very brisk trade in spikes and other track supplies. We quote: Bars, 2 @; Railroad Spikes, 2 1/2 @; Bolt, 4 @; Track Bolts, 3 @; Trestle Bolts, 4 @.

**Coke.**—We quote 11 @ 15 per bushel for washed foundry. Furnace, full supply at South Pittsburgh.

**Coal.**—There is no change in the market nor in prices. We quote run of mine, free on cars in Chattanooga, at \$1.25 @ \$1.75 per bushel. Lump, as per quality, 10 @ 12 @ per bushel.

**Pig Lead.**—4 @; Ingot Copper, 18 @.

**Iron Rails.**—The demand is good. We quote at \$36 per ton at the mill and stiff.

**Steel Rails.**—The mill here has orders booked for some time ahead, and have refused business in the two last weeks. They are quotable at \$47 per ton at the mill.

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St. Louis, Mo., June 16, 1879.

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**CHARTERED RAIL BLAST.**

**COKE AND COAL.**

**IRON ORE.**

**OLD RAILS AND OLD CAR WHEELS.**

**BOSTON.**

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**Scrap.**—There is only a moderate business; prices remain about as last quoted: Old Car Wheels, gross, \$19 @ \$20, cash; Machinery Metal, \$14 @ \$15; Cast Boring, \$10.50 @ \$11; Car Springs, \$28 @ \$30, net; do. Axles, \$26 @ \$27; Locomotive Tires, \$25 @ \$27; No. 1 Wrought Scrap, \$22 @ \$23.50; Boiler Scrap, \$21 @ \$22.

**Window Glass.**—There is a very good business; indeed it is better than ordinarily at this season of the year, and manufacturers have very light stocks to run them dry to stop the factories for the hot weather. Discounts remain unchanged at 75 & 5 % for smaller lots, and 70 & 10 % @ 75 % for larger lots.

**Coke.**—There is a continued steady demand, and the indications are that makers will have all they can do during the remainder of the year. Prices steady at \$1.20 @ \$1.30, per ton, on cars at ovens.

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A KNIGHTHOOD FOR MR. BESSEMER  
is briefly announced by the *Times* of this



regard to rails, but plates, angles, and even "tin bars" of steel. There are magnificent steel works at Easton, in Cleveland. Steel angles have also been manufactured on the Tees; and in a short time, at the Middleborough works, steel fish-plates and other similar materials will be rolled. He noticed, on the Tyne, at Newburn, the Siemens process in active operation, too, and one or two smaller works; but he contends that while it is true that in a few instances, chiefly bar mills, conversion is practically unneeded, still, generally speaking, for want of power in machinery, and for other practical reasons—putting aside the uselessness of puddling furnaces in the steel manufacture—iron mills cannot be applied to the steel manufacture without a costly converting process, the reconstruction and the replacement of machinery, &c. What is needed now is for the iron manufacturers to recognize the inevitable, and to prepare themselves to meet the demand in the form it is now slowly taking. Bolckow, Vaughan & Co. have done this in the rail trade, and their production of steel rails now far exceeds that of their past production of iron rails—and Easton is one of the few industrial oases in a desert made up of cold furnaces and rusting mills. The form of the demand is unhesitatingly showing itself; the age of iron is passing away and that of steel advancing. Taking advantage of recent discoveries, and recognizing the value to Cleveland of the ability to use in the steel manufacture its own iron ores, the producers of plates and angles would do well to commence the long work of preparation needful for the "adaptation" necessary as a preliminary to the production of steel. He feels convinced that the Cleveland district, by utilizing its own ores in the steel trade, may be placed in the front rank of steel manufacturing districts—that is, of Bessemer and allied steels—and that the puddler's doom is sealed.

**The Late William Adamson, of Philadelphia.**—Mr. William Adamson, of the well-known glue firm of Baeder & Adamson, No. 730 Market street, Philadelphia, was attacked by apoplexy on a railroad train near Germantown a few days ago, and died before reaching the Philadelphia depot. Mr. Adamson was well known in the business community, having been for over 30 years a member of the firm, the branches of which extend to New York, Boston, Baltimore, Newark, N. J., and Woodburn, Mass. He was born in Philadelphia in 1822, and was therefore 57 years of age. When nine years old he entered the store of his uncle, Charles Baeder, who is now the head of the firm, as a clerk, and remained with him a few years, when he left and went to New Orleans, where his mother resided. While there he engaged in the printing business, for which he took a fancy, and also expressed a desire to study for the Presbyterian ministry, but this determination he never carried out. When 17 years of age he returned to Philadelphia and entered the employ of his uncle, the firm being then Bodine & Baeder. Being a man of an inventive turn of mind, and a close attendant to duty, he was soon promoted to the superintendency of the vast establishment, and a few years afterward was taken into the firm. Up to 1860 the firm was known as Baeder, Delaney & Adamson, but at that time the death of Mr. Delaney occurred, when it was changed to Baeder & Adamson, the present title. During his life Mr. Adamson was a man of great liberality, and contributed largely to the support of several charitable institutions. He was a patron of the Lafayette College, at Easton, coming next to Mr. Pardee in his contributions to that institution, and was one of its trustees.

### Striking Coal Miners.

MAUCH CHUNK, PA., June 17, 1879.

There is considerable uneasiness among the miners of this region outside of the Lehigh Coal and Navigation Company's men, who are quiet. At Ebervale, A. Pardee & Co.'s men have struck, and at Stockton, G. B. Linderman & Co.'s men are out because they work in a wet slope and want more pay for the inconvenience. At Audendried the men have not worked for several days, having asked for an increase of wages, which will not be allowed. At Beaver Meadow the men in No. 1 mine have struck on account of dissatisfaction with the ticket boss, who, they charge, docks them too much. The trouble is purely local.

**Remarkable Tidal Phenomena.**—Capt. Roagh, of the schooner Windsor Packet, informs us that he noticed, off the south shore of the Bay of Fundy, a mysterious change in the currents; that the fresh water supposed to flow from the St. John River had forced its way across the Bay to the Nova Scotia shore, causing a tide to set in shore, and reverse the general order of things. At ebb tide, when it should be running down, it was for the first two hours running up. The fishermen along the coast were confounded, and also complained of this double current, which so interfered with their nets that they had for five days to stop fishing—some lost their nets by it, while others were wholly destroyed. This is a strange freak in nature, and likely to prove, if lasting, dangerous to shipping, as by this current they would all drift in on shore.—*Windsor Mail*.

The German Reichstag has adopted the government's proposals relative to duties on musical instruments, machines, boats and upholstery. The Bundesrath has passed the Railway Goods Tariff bill. Bavaria, Saxony, Wurtemberg and the Hanseatic towns, however, maintain that the bill involves a modification of the constitution, and consequently requires a two-thirds majority. A committee has been instructed to examine the question of constitutionality.

Peter B. Lawson, chief engineer and superintendent of the West Point Foundry, with which establishment he was connected for 53 years, died recently at the age of 69 years.

## The Semi-Annual Meeting of the National Stove Association.

Boston, June 11, 1879.

The National Association of Stove Manufacturers met here to-day, at the Hotel Brunswick. The meeting was called to order at 11 a. m. by the president, Gen. J. F. Rathbone. The following gentlemen responded to the roll call:

Uriah Hill, Jr.; Union Stove Works, New York.  
A. Bradley, Pittsburgh, Pa.  
G. F. Filley; Excelsior Mfg. Co., St. Louis, Mo.  
G. H. Phillips, Troy.  
Joseph Cox; Cox, Whitman & Co.  
Chas. B. Boynton; Richardson, Boynton & Co., New York.  
W. H. Tefft; Detroit Stove Works, Detroit, Mich.  
Walter P. Warren; Fuller, Warren & Co., Troy.  
S. H. Ransom, Clarence Rathbone; Ransom Stove Works, Albany.  
John S. Perry, Albany.  
S. W. Perry; Swett, Quimby & Perry, Troy.  
R. P. Myers; Myers, Osborn & Co., Cleveland, Ohio.  
W. H. Whitehead; Chicago and Erie Stove Co., Chicago.  
P. B. Acker; Union Stove Works, New York.  
Otis A. Train, W. Stone Smith; Burdett, Smith & Co., Chicago, Ill.  
J. Van Wormer, W. H. Van Wormer, Albany, N. Y.  
A. P. Corse; Corse & Co., Troy, N. Y.  
Geo. W. Elliot; Highland Foundry Co.  
Albert N. Farlin, John Magee, F. A. Magee; Magee Furnace Co.  
H. S. Hubbell; Hubbell & Bro., Buffalo, N. Y.  
E. N. Peck; Co-operative Foundry Co., Rochester, N. Y.  
E. S. Barbour; Detroit Stove Works, Detroit, Mich.  
Geo. H. Barbour; Michigan Stove Co., Detroit, Mich.  
C. H. Buck; Buck's Stove Co., St. Louis.  
W. E. Smith, E. W. Anthony; Smith & Anthony Stove Co., Boston, Mass.  
E. L. Messenger; S. S. Jewett & Co., Buffalo, N. Y.  
John D. Green; Union Stove & Mfg. Co., Pittston, Pa.  
Thos. Jones; Foxell, Jones & Co., Auburn, N. Y.  
H. C. Thompson; Excelsior Mfg. Co., St. Louis.  
Samuel E. Emery, Jr.; Comstock, Castle & Co., Quincy, Ill.  
Samuel Smythe; Union Stove & Mfg. Co., Pittston, Pa.  
E. R. Thomas, G. D. Sanford; National Stove Works, N. Y.  
Chas. H. Andrews, Newton, Mass.  
Jas. H. Coddling; Dighton Furnace Co., North Dighton, Mass.  
W. J. Towne; Highland Foundry Co., Boston, Mass.  
James Spear, Philadelphia, Pa.  
Miles Pratt; Walker, Pratt & Co., Boston.  
Sam. S. Utter; Chas. Noble & Co., Philadelphia and New York.  
D. G. Littlefield, Albany.  
S. O. Rogers, official stenographer, Troy, N. Y., and others.

The President opened the meeting with the following remarks:

### Address of the Chair.

By a resolution of the association the President has been relieved of the duty of preparing an address at the semi-annual meetings. If I remember rightly, I had the honor of offering the resolution in question, and I may cheerfully avail myself at this time of its provisions, among other reasons, from the fact that in the past history of this association my honored predecessors have exhausted almost every topic that could be woven into an address—the history of our country from the time the wild Indian inhabited it, and long before the era of stoves to the year 1878; the history of our late unpleasantness with our brethren at the South; the laws with reference to patents and bankruptcy; the imposition of duties for protection and revenue; the broad questions of political economy—in short, all questions in any manner relating to our craft have been presented so ably and exhaustively, that nothing is left me save poetry. And, although Mount Parnassus, hallowed by the muses as it is, may possibly abound in hematite or magnetic ore, yet, with no flying Pegasus to aid me, but alas! only a cook stove with rigid legs and no special adaptation for wings, its airy heights must remain to your chairman practically inaccessible.

Fortunate is it for Parnassus, and still more fortunate for you, that my plain thoughts should be thus of necessity presented in prose, however strongly the want of topics left me by my predecessors might benefit me if gifted with the like inspiration of Boston's wittiest bard—

"To cut one caper on the toe of Rhyme."

And again, we are just now all trying, either from choice or from necessity, to be economical. Time is money and printing is expensive, and who can tell the value of the time which you might be compelled to waste as listeners, or the amount to which our printing bills might be swelled should your president or any other of the "iron founder's persuasion," suddenly discover himself to have been "born a poet," and with open faucet should discharge remorselessly upon this utilitarian assembly the misty contents of his "elevated reservoir."

The present meeting, in accordance with a resolution of the association, is to be the last semi-annual, and it was urged last winter at Rochester that it should be eminently social in its character.

In pursuance of the resolution of this association, we are assembled this day in the famed metropolis of New England, to discuss the principles by which one of the great manufacturing interests of our country is to be nurtured and conducted. And where is it more fitting that such an assembly, and for such a purpose, should be convened than in this city of Boston? Bos-

ton, representing the New England from which most of our forefathers came, the sturdy pluck, enterprise and principles of whose people have, more than all else beside, made our great country what it is to-day. A majority of the men who have made the West great and powerful moved from the East. A large part of the capital necessary to develop the great West, to build its railroads and cities, was drawn from New England. And so, whether we come from the West, the Middle or Southern States, most of us come home to-day—if not home to us, to the fathers whose memories we reverence. We come, therefore, to Boston, whose inventive genius ever keeps pace with the demands of the age; the steady flow of whose capital gives motion to the countless wheels of her manufacturing industries; whose merchant princes have long whitened every sea with the canvas of their ships; whose scholars have contributed some of the best thought which has lent luster to our literature, and whose poets have flung so freely at the feet of the muses the graceful garlands of song. A city, too, famed as the nursery of freedom; whose streets are historic with memories of the Revolution, and in whose harbor still lingers the flavor of tea, poured out as an impromptu oblation to Liberty. Old Faneuil Hall, in our very midst, still echoes with the bold and stirring voices of the patriot statesmen, pledging their fortunes and sacred honor to the cause in which they had embarked, and the shaft of Bunker's monument rears its tall form in the distance, to tell the silent but impressive tale of how well their pledge had been redeemed upon the land, and one of New England's most gifted living poets, in magnificent epic has hung in graceful folds in the corridor of song the tattered ensign of Old Ironsides, and preserved in matchless verse the fame which the proud old frigate so well had won with the thunder of her guns on the sea.

Enough has perhaps been said of the advantages offered by this renowned capital of New England as a gathering place for us on this occasion, without more than a passing allusion to the codfish, brown bread and clams, to the pumpkin pies, the baked pork and beans, and a host of other Yankee notions with which she ministers to the comfort, or gratifies the caprice of her visitors. And all these advantages combined too in that happy accuracy of location, so providentially allotted to this identical city, which preserves it equidistant at every point from the surrounding horizon, and so justly entitles it to the proud name of "Hub of the Universe." Where could such another gathering place be found?

I believe our gathering will not only be pleasant, but profitable, and that our action at this meeting will lead to a more successful and satisfactory business for the year. I think we have much to encourage us as to the future. The gradual, but healthy, revival of nearly all of the manufacturing industries, the settlement of the question of a specie basis for our currency, the large number of the industrial class of emigrants landing at our ports, the largely increased exports of our country for 1879, the fact that more than \$300,000,000 of our bonds held abroad have been repurchased—these, among other facts, are all signs of promise, and are, in my judgment, clear indications that the business outlook is surely and steadily improving, and that we may confidently look for prosperity in our business if wisely and prudently conducted.

Mr. Perry moved that the thanks of the association be extended to the President for his able and beautiful address, and that the same be printed. Carried.

Mr. Pratt announced that arrangements had been made for the entertainment of the members by a carriage ride this afternoon, and a sail on the bay to-morrow. He gave an interesting account of some of the points of historical interest about Boston, which would be shown to the members.

Mr. Bradley, treasurer, made a report showing that the association had money in the treasury, after paying all the expenses of the past six months, and no assessment for the next half year would probably be necessary.

The papers prepared by request of the committee on essays, were then called for by the Chair. Mr. Giles F. Filley, of St. Louis, read the following:

### Heat.

Natural science, in its growth, has done much for the expansion and development of man's thought and knowledge of all the practical arts; but in none has it opened a greater field for investigation, or offered greater munificence for investment, than the one I have selected as the subject of this paper—Heat. A writer in the *Stove Trade Gazette* has said: "Science has given to us facts and figures, and the inventor and improver of stoves must use these, and adopt the proper means to accomplish the ends desired to be secured, and he who succeeds will do a greater work for mankind than has been done by any one man for many years."

I am aware that in our scientific manuals only a scanty reference has been made to the subject of heat and therefore the public knowledge regarding this subtle agent is very defective and short of what it ought to be. But with all the difficulties that we shall have to encounter and overcome, none are more worthy to be overcome and secure a greater reward for the labor and expense expended. For, by understanding the laws and relations of heat, we make clear to our minds not only the mutual dependence of forces, but how to get and utilize the greatest amount of heat from a given amount of fuel consumed. Heat is governed and controlled by natural and absolute laws. It can be generated. It can be absorbed. It can be radiated and reflected. It permeates all things, and is absorbed and attracted by all objects colder than itself. It is the source of all power, and all life depends upon its existence.

As our enterprise is directly connected with the construction of apparatuses in which fuel is placed for generating heat, would not the time be well spent by us if

we would examine more critically into its philosophy, and become more familiar with the facts and conceptions regarding this subtle agent, and seek diligently the links of law which underlie the facts and give unity to their most diverse appearances; to see if we are using the best constructed stoves for accomplishing the best and most economical results. We make one kind of stoves for warming our houses and offices, which should be so constructed as to radiate the greatest amount of heat in the proper direction—to secure the greatest amount of comfort with the least possible expense. We make another kind to perform the office of cooking, which should be so constructed as to do the greatest amount of work with the least quantity of fuel, at the same time producing the best results.

Now, are we sure that we are constructing our modern heating and cooking stoves in such a manner that we can derive the best results from them? If we are not, ought we not to be censured for our ignorance and stupidity? For we have had seventy years of experience in stove making, and what advance have we made over Silas Reed, Hoxie, and others of the past? It is humiliating to think that history is repeating itself in stove construction. With all our boasted knowledge and advancement in the fine arts and mechanical skill, we are imitating the ancients. If we should go back 5000 years, we would find the same contour of outward form that we find to-day in some of our heating stoves. The ancients were excusable for their want of knowledge, for they were the childhood of the race. But how is it with us? We have had, so to speak, line upon line and precept upon precept. We have had all the experience of the past and the knowledge that is obtainable from those who have gone before, and still we persist in giving to the public those rude and unscientific forms, bedaubed with something we call ornamentation. In the earlier period of stove making we had the cylinder and the box stove; from the cylinder came the cone or taper shape. This gave but little satisfaction, as the heat was radiated in an upward direction toward the ceiling, heating the lower parts of the room but slightly. An improvement upon these constructions was in the making of what is called the inverted cone or bell shape. This was much more satisfactory than the other, because the heat was radiated toward the floor, meeting with the surrounding objects that were intended to be heated thereby. It is well to bear in mind that heat is always radiated at right angles from the surfaces of heated objects.

In view of the facts as stated as to these forms of stoves, what are the conclusions reached in the construction of our modern base burner. Although in outer form it resembles the ancient Hebrew Tanour, examined in the light of architectural design and philosophy, no ruder or less economical construction could be devised. From top to base its contour is of such a form that the radiation of heat will be in such lines as to be almost useless. If we look at the interior, we shall find it to be equally faulty for the purposes of combustion of fuel. Passing to that part of the stove containing the magazine, we find that there is but little space to be occupied by the products of combustion, from which our heat is derived. This is so manifestly faulty, that a calculation as to what is, and what ought to be, the space devoted to heat, would not be out of place here.

In the ordinary medium base burner this upper cylinder would contain about 4000 cubic inches of space; deducting from this the ordinary magazine, 1200 cubic inches, would leave us about 2800 cubic inches as a reservoir to contain the products of combustion, and to furnish the means for the absorption and radiation of the heat produced. If the stove consumes one pound of coal per hour, we produce about 13,000 units of heat, which takes about 22 pounds of air, which occupies a space of about 190 cubic feet. This air to be provided for to burn one pound of coal, the products of which in gas and vapor will occupy a space of at least 300 cubic feet, or 518,400 cubic inches. In practice this is nearly doubled, but this is sufficient to show that what we call the base-burner stove is criminally faulty in construction; but little room is provided to contain the products of combustion that should be dissipated to surrounding objects, besides driving more than half of our 13,000 units of heat directly into the chimney, making the chimney exceedingly hot, which seems to be the object of the constructor. The *Metal Worker* a few years ago published the results of some experiments made in the city of New York even more startling than this, wherein it is shown that where the capacity of one cylinder was increased four times over the other, the small one lost 15 degrees of heat in its passage of 3½ feet, while the larger one lost over 300 degrees of heat. This shows the importance of ample space to contain the products of combustion for the purpose of radiation.

But, says the maker, we must follow the dictates of fashion; something to dazzle the eye and tickle the fancy. Brighten the surface and gild the knobs that attention may be diverted from the gross imperfections of construction, all of which is to prevent what we most need—the radiated heat. Williams, Tyndall, Box and others, have illustrated this important fact so fully that it needs no argument to prove it.

In our examination of heating stoves we find that there are three essential requisites in order to produce the best results. First, we must have a properly constructed fire chamber to burn a given quantity of fuel, producing the maximum quantity of heat; second, we must have a reservoir chamber of sufficient capacity to hold the heat and products of combustion, with sufficient surface to absorb the heat produced; third, the contour of the surface must be such that the heat will be radiated toward the floor and surrounding objects. When this is done we have got all that can be had in the way of an economical heating arrangement, and we should not stop at anything short of this result. This plan of construction would save millions of dollars annually in the economy of fuel alone, besides the inestimable comfort that would be attained.

Another part of our enterprise is that of making cooking apparatuses, and as modern civilization demands an arrangement for the purpose of preparing proper food in the best and most economical manner, it behooves us as manufacturers to examine very critically into the several principles of construction, having in view the laws governing heat in its application to the different parts, and see if we get equal distributions in all the functional elements which we employ in our cooking apparatuses. Nearly a century ago Count Rumford published his experiments in cooking with sheet and cast-iron stoves. Rude as they were, he determined the fact that cooking could be done with great economy, and that food so cooked was superior to the manner then in vogue. In after years his suggestions were followed up by Silas Reed, Hoxie and others, Reed making the old template stove—that is, a stove so constructed that the fire passed under the oven, up the back, thence to the front along the top to the exit pipe. This was economical in the consumption of fuel, but as a baker was deficient. Hoxie taking up this matter made a stove with the fire-box on top of the oven, passing the heat along the top, down the back, thence to the front under the oven, in what we call a sheet flue, thence down into a channel made in the hearth to the chimney. The turtleback flue, so called, is similar to this construction. Here was the commencement of what we call the downward-flued stove. In his experiments and use he found that the heat and products of combustion took a central course down the back and under the oven, heating the oven to a great degree through its center, leaving the outer sides comparatively cool. Of course, with this unequal degree of heat in the oven, the stove could be nothing less than a failure, and yet we find that the cooking range, which has been so popular, is made upon this construction.

Hoxie, failing in making a passable cooking arrangement with his one-flued stove, divided the flue in two parts, making what is called a two-flued stove. In this the heat passed over one side of the oven, down one side of the back, along one side of the bottom, to the front; returning on the other side up the back to the exit pipe. In this he was no more successful than when he used the one flue, because when the heat and products of combustion passed over one side of the stove, the absorption and radiation was such as to take up a good portion of the heat, leaving but a small portion to be absorbed by the other side, which must from necessity render one side of the oven hot, while the other side would be comparatively cool. How can it be possible that such a stove could be a good baker? Were we living in the days of miracles we might be made to believe such a thing possible, but as the days of miracles have passed and the laws of nature are still in force, we are inclined to take more stock in the law than such a miracle, and yet the present range is made and based upon the construction that was abandoned by Hoxie as being impracticable 60 years ago. The result of this construction is the same as to a person warming himself by an old-fashioned fire-place on a cold day; while one side is burning the other side is being frozen. Hoxie finding his one and two-flued stoves a failure, he invented what we call a three-flued stove. By this arrangement the products of combustion and heat passed over the top of the oven, down the flues in the back corners of the same, thence along the sides toward the front, again returning through a center flue up the center of back to the exit. By this arrangement it was found the greatest heat was applied to the coldest part of the stove, on account of radiation and contact with the colder air of the kitchen, and when a portion of the heat was thus expended it was returned through the center flue, where less heat was required, thereby insuring a more equal degree of heat around and in the oven than by any other known means. This plan, when examined in the light of philosophy and the laws by which heat is governed, will be found to be a perfect adaptation to the wants required, of which 60 years' use has fully proven.

We will here venture the assertion that our present three-flued stove as a cooking apparatus will never be improved; not that all three-flued stoves are exactly right and perfect, but the principle and application is right, and the economical results of good cooking goes to prove it.

Now we might ask why go back to the abandoned construction of Hoxie of 60 years ago, of which our modern range is a counterpart, which all philosophy and the effects of heat show to be totally wrong? Fashion, no doubt, is the cause; a desire for tinsel and show, in the place of convenience and utility; and, as Mr. Keap has expressed it, "it is because the range has the appearance of a piece of cabinet furniture."

We cannot close this article in any better manner than by again quoting the writer in the *Stove Trade Gazette*: "Science has given us facts and figures, and the inventor and improver of stoves must use these and adopt the proper means to accomplish the ends desired to be secured, and he who succeeds will do a greater work for mankind than has been done by any one man for many years."

On motion of Col. Warren, the thanks of the Association were tendered to Mr. Filley, and the paper was ordered printed.

The Chair then called on Mr. J. C. Bayles, who spoke as follows:

### The Problems of Utility in Stove Manufacture.

Mr. President and Gentlemen: If I had known what Mr. Filley would write before I wrote my paper, I should never have written it; and after hearing his paper I should not read it, were it not that by following him I may be able to give you a pleasing, and perhaps instructive, contrast between practical knowledge and theoretical deductions.

At the Rochester winter meeting you did me the honor to listen, with apparent interest, to some remarks on the subject of "Taste and Art in Stove Ornamentation." To-day I shall venture some general suggestions on what may be termed the physical problems encountered in stove manufacture. Properly, this should have had precedence over the aesthetics of the business, and would







have been first considered had I had the vanity to suppose that I should be called upon to deliver a course of lectures on stove construction and ornamentation. One subject naturally grows out of the other, however, for the reason that, in our search for art excellence, we are apt to overlook the fact that, in an object intended primarily for use, beauty cannot exist until it is developed out of utility. In other words, to use the slang of the high-art critics, we must decorate our construction, but never construct our decoration. The moment we sacrifice utility and adaptation to ends, to graceful form or ornamentation, we find that beauty is a coy maiden who will not be wooed nor won.

#### ANCIENT AND MODERN SHIPS.

Perhaps I can best explain my meaning by an illustration. In ancient times people built ships with a view to making them beautiful. They reared turrets and castles on their decks, draped them with embroidered sails and bright-hued banners, carved them, painted them in rainbow colors, and even gilded them. Some of these old ships cost vast sums, but they were not useful as ships, and the beauty which their builders sought was not attained. They were no more beautiful than Chinese junks, after all, and in our large knowledge of marine architecture, we smile at such miracles of bad construction and over-ornamentation as the Great Harry, described by Longfellow as towering

—crank and tall,  
With bow and stern raised high in air,  
And balconies hanging here and there,  
And signal lanterns and flags aloft,  
And eight round turrets, like those which frown  
From some old castle, looking down  
Upon the drawbridge and the moat.

Presently ship builders and ship owners began to realize that the object of a ship was to sail, and that speed and seaworthiness were qualities of more consequence than those which mere decoration imparted. They then turned their attention to the adaptation of ships to the purposes for which they were designed—namely, navigation; and the nearer they approached the maximum of utility, the more beautiful their work became. One has but to compare the great, clumsy, top-heavy, three-masted, hollow-backed ships of the sixteenth and seventeenth centuries, with the trim, compact clipper ships of to-day, or even with our iron steamers, moving with easy grace and parting the waters with scarce a ripple, to see that in ships beauty is co-existent with utility, and that it is found in the lines of easiest displacement and not alone in ornament.

#### WHY THE QUEST FOR BEAUTY HAS FAILED.

What is true of ships in this respect is true of stoves as well. Looking back through old catalogues, to the remarkable productions of Elihu Smith, in which shaving glasses, flower vases and crystal pendants were employed as ornaments, or still further back, to some of the fanciful stoves of previous centuries, we find an effort to secure beauty. But they are simply hideous. With every step in the direction of real improvement, we have insensibly approached graceful proportions, beautiful lines and artistic effects. We can, and often do, make useful things ugly by overloading them with unnecessary and inappropriate ornament; but this is simply due to bad taste and a mistaken notion of the function of ornament. If our product is a thing of use, adapted as nearly as may be to the purposes for which it is intended, it will have something of inherent beauty which, though we cover it over with meaningless and inappropriate ornament, will still exist and claim recognition. It is only when we sacrifice utility in our effort to beautify, or venture upon the dangerous ground of structural ornament, that we arrive at absolute ugliness—in ships, or stoves, or any other creation of man's invention.

#### THE CLAIMS OF UTILITY.

If what I have said thus far is correct, it follows not only that we should not disregard utility in our efforts to secure beauty, but, as our product is to be a thing of use, we should make utility a first consideration. At the risk of being contradicted—or, at least, of convincing many whom I address that I do not know what I am talking about, I venture to say that our stove manufacturers have not given the problem of utility—the perfect adaptation of means to ends—nearly as much attention as they have given the problem of ornamentation. In this I speak advisedly, for I have had for some years an intimate acquaintance with stove manufacturers and their products. It has been my pleasure to study with some care the literature of heating and those branches of chemical and physical science which have a more or less direct relation to heating, cooking and the combustion of fuel. At times I have attempted to make contributions of practical value to this literature, and have sought help from many friends in the business, but have found to my surprise that few of them had given any attention to scientific inquiry and experiment, and that, outside the practical or the commercial departments of their business, they had no information to impart. A manufacturer of recognized ability, whose judgment I trust and whose knowledge of the subjects he has learned from experience—or, more properly, from contact with them—is thorough, one day surprised me by confessing ignorance of the composition of smoke, and asking me if there was any book from which some knowledge of the phenomena of combustion could be gained which did not require for its understanding any knowledge of chemistry or mechanics. Here was a large and, at the time, successful manufacturer, making I know not how many tons of stoves a year—heaters, cooks, coal stoves, wood stoves—a complete and extensive line, including base burners, which did not burn at the base—by his own confession ignorant of the laws and phenomena of combustion, ignorant of the nature of the fuel he made stoves to burn, and ignorant of the terms used in the literature of mechanics.

#### STOVE MAKING BY "RULE OF THUMB."

Now, I would not be understood as implying that, as a class, stove manufacturers are lacking in general information or wholly ignorant of those branches of physical and

chemical science which pertain especially to their work. But I do say that I know of no department of manufacture equally important in which so little attention has been given to the study of natural laws, or in which there is so much working by rule of thumb. "I have known a great number of stoves made and put on the market by the thousand without one experimental test to determine their efficiency. From year to year they have been changed in more or less essential particulars, but not improved in any noticeable degree. Once in a while stoves thus made are utter failures, and are thrown back on the maker's hands by the trade. As the rule however, they work. Of course, they do. Any man who can make a stove at all can make one in which fuel will burn after a fashion, and from which the products of combustion will reach the chimney. If they are economical and efficient stoves, it is often because of an accidental success in the arrangement and proportioning of parts, than because of any careful and intelligent study, or calculation on the part of the makers.

#### IS STOVE MAKING A PROGRESSIVE ART?

Now, let me ask a few direct questions, less with the expectation of having them answered than as suggestions for thought, at which no one will take offense when they are offered in this general, impersonal way.

In what I have said about some of the stoves I have seen made, have I not described the history of a very large proportion of the stoves which have been made during the past ten years?

Is it not true that but few stove manufacturers of the present day have given any intelligent attention to the problems which must be solved before any important progress can be made in the direction of greater economy of combustion, greater efficiency of service and a more perfect adaptation of means to ends?

Is it not true that instead of progress in these respects during the past ten or twenty years there has been a retrogression?

Is it not true, as the older manufacturers claim and as my own investigations lead me to believe, that in the days when stoves were made simply for service, with only a little of simple or grotesque ornament, they were better stoves, considered simply as heating or cooking machines, than the average of those made to-day, which, considered as ornaments, are superior to anything known to the last generation?

Is it not true that, instead of gaining knowledge on matters pertaining to economical and efficient heating and cooking during the past century, we have forgotten much that was then known and practiced?

#### THE PAST AND PRESENT OF THE ART.

If we look through the voluminous and interesting, but little known, literature of heating and ventilation, as found in the writings of early experimenters and their historians, or, as epitomized in Bernan's admirable work—now unfortunately out of print and accessible only to those lucky enough to pick up stray copies at the second-hand book stalls of London—we find that, as regards these two important sciences, we have progressed by moving in a circle. Let us take, for example, the open stove. In nothing now made do we fail so conspicuously in attaining the excellence reached by our ancestors. Either we have utterly forgotten much that they knew, or have disregarded it almost wholly. Whichever is true, we find manufacturers of such stoves, with perhaps a few exceptions, beginning by repeating errors older than American history, and spending the remainder of their lives in blindly groping after remedies which were sought and found a century or more before they were born, and of which fuller and more complete records are accessible than of anything in the same line since done. The old-fashioned open stove, of the type now obsolete, was not pretty to look at, but it would draw, which is more than any open stove of the present day that I know of will do under average conditions. Now, there is a reason for this difference, and what that reason is can be found by any one who will take the trouble to learn how the old Franklin stove was made and why it was made so. I have not time to enter upon a discussion of this subject, but will venture a few general remarks as bearing upon my argument. Those who made open stoves a couple of generations ago, constructed them with sole reference to securing good combustion and insuring the passage of all the products of combustion to the flue. Sometimes there was a rude attempt at decoration, but it was made secondary to good construction in every respect. At the present time we find our manufacturers seeking primarily a good external appearance, and at every move in this direction they are likely to violate some essential principle of good construction. This is all the more likely when they are ignorant of these principles, and cannot see any reason why they may not change the lines or vary the proportions arbitrarily. The result they reach is very satisfactory to look at, but when set to work it is usually found that it would need an exhaust fan in the chimney to make it draw, and that the smoke and gases of the fire, rising in the general direction of the flue and sauntering about looking for a way out, would about as lief go one way as the other, and usually end by straddling the arch—half coming out into the room and half moving leisurely into the chimney. When the fire is well under way they keep together pretty well for company's sake, but there is almost always a slight escape of gas—which is due simply and solely to bad construction.

#### COUNT RUMFORD'S EXPERIMENTS.

Between 1753 and 1814 there lived one of the most remarkable men the world has ever produced. This man, Benjamin Thomson by name, was an American, but, having strong Tory sympathies, he left the colonies when the war of the Revolution was menaced and passed the remainder of his life in Europe. As Count Rumford he is remembered by name, and as an original experimenter in the domain of physics he has left an imperishable record, which entitles him to a

place among the greatest scientists of the world—a place he will hold in all ages. It is not my intention to review the great work undertaken and accomplished by Rumford, for it is only in part germane to my subject and is too extensive to be briefly summarized. I will only mention his investigations in two lines, and show as clearly as I can how different are the results which each has produced. Satisfied that the then accepted theory of heat was fallacious, and the phlogiston hypothesis of combustion an absurdity, he undertook a series of experiments to demonstrate the nature of heat. The results led to conclusions so surprising that while Rumford, having no time for controversy, proved the reasonableness of his own convictions without propounding a new theory, he effectually demolished the old ones, led the scientific men of the day irresistibly to the conclusion that heat was a mode of motion, and laid the foundation on which was subsequently propounded the law of the correlation of forces. During these same years he undertook some experiments in stove construction, which had for their object efficient and economical heating and cooking. He began with the baking of bread. In his fuel experiments he found that each pound of bread baked required 34-96 pound of wood. Theoretically about 14 pounds of bread should be baked with one pound of pine wood. To cook a dinner for 927 persons required, he found, 450½ pounds of soft coal. Theoretically the same amount of cooking should have been done with a fraction over 71 pounds. In the army he found that the fuel consumed in cooking averaged 10-11 pound per pound of food cooked. Rumford started with such data as this, and in the House of Industry, at Munich, we find him attaining the economy of cooking 600 pounds of food, during 4½ hours, with 44 pounds of pine wood, or about one-thirteenth of the fuel needed by the army. In the heating line he conducted a series of experiments so exact and so thorough, that to the stove manufacturer of the present day they would be in many things a revelation. Certainly they furnish data and suggest methods of investigation and experiment which, if used judiciously, would lead to the solution of many problems which now vex the trade and are ignored, or solved in the easy old way—a good guess and divide by two.

Now, let us note briefly the results of these two lines of experiment. Rumford's investigations into the nature of heat and his deductions therefrom gave a powerful impulse to scientific investigation and, incidentally, to mechanical progress; and the conclusions he reached from the observation of phenomena noticed in turning out the bore of a cannon, are the corner-stone of our knowledge of thermo-dynamics. His experiments in cooking, and boiling water and heating by stoves and open fires, are practically forgotten. I know of but one stove manufacturer in this country who has ever read Rumford's works. There may be others, but for all practical purposes Rumford's contributions to the knowledge after which so many of us are blindly groping to-day are effectually lost to the world. Once in a while I am favored with a report of the phenomenal performance of some modern cook stove at a competitive test for a county fair premium, and am not a little amused at the figures when I remember that Rumford kept 330.8 pounds of water boiling continuously for one hour with 1 pound of pine wood. If there is a stove in the country which can come anywhere near this economy, I should be very glad to hear of it.

#### CRITICISM VS. COMPLIMENT.

Probably you have already discovered, gentlemen, that it is not my intention to waste your time and mine in paying compliments. Honest criticism is eminently wholesome, and, if intelligent as well as honest, is worth vastly more than pleasant phrases. Is my criticism in this case intelligent?—that is, does my assumption that stove manufacturers have generally neglected the practical problems of their business, and given their attention chiefly to matters of secondary consequence, rest upon a substantial basis of fact? Is it true, or is it not, that a very large percentage of the stoves now in the market are made by rule of thumb, and that the reason why some are better than others is because some men's thumbs are smaller than those of their neighbors? Let us see.

#### BRICK AND IRON OVENS.

The brick oven of the last generation was counted in its day, and is still remembered as, the most perfect baking apparatus ever devised, judged by the quality and flavor of the food cooked in it. This is generally conceded by the trade, I think, especially by those who know from experience how food cooked in a brick oven tastes. If you ask a manufacturer why he cannot produce equally good results in a stove oven, he will look at you in astonishment and tell you that it is impossible. Now, in point of fact, it is not impossible—nor, indeed, is it a matter of any serious difficulty. I know that the two staples dear to the New England heart—baked beans and brown bread—can be baked as perfectly in a cast-iron cook stove, properly constructed and carefully managed, as in any brick oven ever built. Now, there is a reason why the brick oven was better, as a baking apparatus, than the ordinary cook stove of to-day. This reason is easily found—indeed, it is almost self-evident—and I doubt if there is a manufacturer in this association who could not make a cook stove which, with intelligent management, would bake as the old brick oven baked, if he were to give the problem intelligent study. When we remember that beans and brown bread are losing their once powerful hold upon the popular favor, and that Indian pudding is becoming a tradition, we are apt to think it is because beans, Graham flour and corn meal are not as wholesome and palatable food as our ancestors thought them, or that we, in our progress toward higher standards of civilization, have developed finer tastes. But the reason is, we cannot cook them as our forefathers did—by long subjection to low and uniform temperatures—because our stoves are not made with a knowledge of the conditions under which cooking can best be done.

#### SPIT AND OVEN ROASTING.

The spit of the last century was a device

which, alas, we of the present day—"heirs of all the ages," but, unfortunately, deprived of much of the best part of our inheritance—know not. That the "funeral baked meats" of to-day are to the spit roasted meats of the past,

—as starlight unto sunlight, and as water unto wine, is a fact which does not admit of intelligent contradiction. But it would require no great study of the philosophy of cooking to show why meat roasted by direct radiation in a dry atmosphere with free circulation, was necessarily better and more agreeable food than meat baked in a tight box and a steam-laden atmosphere charged with odorous gases. The stove manufacturer will tell you that it is impossible to imitate spit roasting in an oven, but I know that not only is it possible, but that it has been done, and that the problem presents no more difficulties than those encountered in devising a new form of urn which shall be a little uglier and more inappropriate than any now in use.

#### UNSOLVED PROBLEMS OF STOVE MANUFACTURE.

Now, let us review as hastily as possible a few of the unsolved problems of stove manufacture, which are of vital consequence as affecting economy, efficiency, durability and general utility.

Apparently there is no data furnished by the practice of our stove founders, from which it is possible to determine what are the proper relations for efficiency between the sizes of oven, flues and fire-box in a cook stove. We do not even know whether the relationships of economy are between the area of the oven or its cubic contents on the one hand, and the flues and fire-box on the other; and whether in the last two items, the factors of our equation are area or cubic contents. Not only do we seek blindly for a form of equation, but we are as yet ignorant of the factors which must enter into it.

We next strike a difficulty at the pipe collar and pipe. No one could determine from the practice of the time what is the best relation of size between pipe collar, flues and fire box, for the reason that no manufacturer knows what that relation is. Here, again, we cannot formulate an equation, for we have no factors. The same is true of length and size of pipe.

Suppose it is necessary to increase the size of the oven of a stove which, by accident or calculation, has approximately correct proportions. How are we to determine to what extent and how the proportions of fire-box, flues and pipe collar should be varied? If we should make an equation for this, it would merely stand as the algebraic expression of absolute ignorance, and would give us results no more satisfactory than if we were to assume that the height of the stove leg, multiplied by the freckles on the cook's nose, and divided by the square root of the family cat, equals the size of the flues plus the wood shed, multiplied by the number of times the boy has to be thrashed before he will bring the wood in.

There are no data from which to calculate the relative flue capacity of cook stoves for wood, hard coal or soft coal, nor the velocity of current or draft in pipe or chimney to produce the best results.

There are no data developed from practice bearing upon the proper depth of fuel on the grate surface. There is no known relation between the area of grate bars and of openings. My observation on this point leads me to the conclusion that if any one manufacturer is right in his practice all the rest are wrong; and, considering the odds against him, I cannot resist the conclusion that he is wrong, too.

Bituminous coal is the cheapest and most abundant fuel of the country. In many large and populous districts it is almost a sole dependence, owing to the absence of wood and the cost of anthracite. As yet we do not know how to burn this fuel properly in cook or heating stoves. Here is a problem of the most practical kind which awaits solution, and which will not be solved until it is approached scientifically. It will not be solved by tinkering with anthracite and wood stoves.

Water-backs, or water-fronts, are necessary adjuncts to many lines of stoves and ranges, but how often is it remembered that the heat taken from the fire for heating the water cannot be used for any other purpose? It has gone into the hot water circulation and is not available for heating the oven. Judging from much of the practice of the time, it is evident that most manufacturers expect to eat their cake and have it too. Is any one prepared to furnish the figures showing how much the addition of a water-back diminishes the amount of heat obtained from the combustion of a given quantity of fuel in a given time which is available for cooking?

In calculating the size and shape of flues, does any one calculate the effect of angles or of friction? If answered yes, I would ask if any one can tell me what difference should be made in shape between flues intended simply for the passage of hot gases, and those in which it is intended that the gases should lose by rapid radiation as much of their heat as possible?

#### TECHNICAL QUESTIONS.

If I had not already claimed so large a share of your time and made such heavy drafts upon your patience, I could extend this catalogue of conundrums indefinitely. I might talk about the expansion of plates and the variations of practice in making allowance for it; about the reasons for hardness of iron melted in the cupola, when soft iron is expected; about the best form of cupola, and the best fans or blowers; about a score of things belonging strictly to the technical part of the stove business, each of which would lead up to an interrogation point and stop there. But I have already said enough to show that I was not without warrant in saying that stove founders have not given the problem of utility the attention its importance demands. So long as the questions I have asked remain unanswered, so long will you remain open to the charge of working, not by the light of scientific knowledge, but by rule of thumb.

#### THE TENDENCIES OF PROGRESS IN STOVE FOUNDING.

Experience has taught me that predictions

are unsafe things, but I do not hesitate to express the belief that the time is nearer at hand than most of us realize, when, in stove making, haphazard experiment and work by rule of thumb must give place to the application of rules formulated on the results of patient search and exact scientific investigation. I believe I see already the evidences of a reaction in public opinion which will compel stove manufacturers to give the problem of utility more attention than they have thus far considered necessary. It is inevitable. If we cannot determine these vexed questions which, if we think of them at all, only perplex us, we must call in the aid of the physicist; if not, we must make room for a new generation of manufacturers whose products will replace ours. There is not one of the numberless problems remaining unsolved but which has a direct and practical bearing upon the economy, efficiency and durability of the stoves we make, and for which a solution cannot be found if we seek it patiently and skillfully. For a title of what has been spent in litigation over certain unimportant patents, I would agree to have made a series of experiments which would result in making stoves by rule a possibility.

#### WILL STUDY AND EXPERIMENT PAY?

It may be said that such investigation, while interesting, would be unprofitable, since the public do not discriminate in such matters, and would not appreciate the difference between a stove scientifically constructed and one which was good enough for practical purposes. I consider this arrogant nonsense, notwithstanding my respect for some of those who utter it. The public are by no means the fools we credit them with being. While the competition among manufacturers is for the greatest number of "selling points" and the most stunning magnificence, the public have no choice but to take that which appeals to the eye. They believe, and most manufacturers admit, that, as regards their inside arrangements, stoves of a class are pretty much all alike. When some one shall make a stove which is conspicuously and demonstrably better than the average, and shall attain in its practical working a maximum efficiency with a minimum consumption of fuel, it is probable that the public, who are ever alive to their own interest in everything else, will pass it by unnoticed? Will it not be true of this as of every other conspicuously good thing—the public will recognize its value and buy it in preference to stoves which are not excellent and not economical.

#### BEAUTY AND UTILITY.

Gentlemen, we have made a mistake, many of us, in supposing that the outside of our stoves demanded more attention than the inside, and that if utility interfered with our ideas of beauty, utility must be sacrificed. We have made the mistake of the shipbuilders of old, and must turn our faces in another direction. In this it is not necessary that we should abandon beauty and sacrifice that which delights the eye. But a stove is a stove and not an ornament. We may and should ornament it, but its first object is one of utility. If we but make it as nearly perfect a stove as may be, it will assume a beauty which only that which is right can possess. The artist will find in its simple utility his highest inspiration to successful endeavor, and its ornamentation will grow until we find use and beauty going hand-in-hand together.

#### THE COMING STOVE MANUFACTURER.

The man who leads the progress of the trade in this new direction will be a man of courage and originality. I expect that he will be a young man, for he must be unhampered by traditions and have no respect for conventionalities. He must see nothing as a necessity for which an intelligent reason cannot be given. His aim will be to make the best stove he can, without regard to habits which are now mistaken for fashions, and uninfluenced by the cackle of those who claim to, but do not, express the public opinion. He may violate all our notions of what is correct in "form, outline" and "general configuration," and probably will; but he will have taste, as well as courage, judgment, as well as originality, and we shall be surprised to find that, in his finished work, he has attained the beauty which has eluded our eager but mistaken search. We give the artist a task beyond his powers. We bid him make us a beautiful case, into which we may put the fire-pot, the flues and other necessary elements of a stove. The artist is confused by the conditions of his task. The coming stove manufacturer will say to the artist, "Here is a stove. Every line, every proportion is right; decorate it." His task is defined, and by the very limitations of his work his ingenuity is quickened and his fancy stimulated. The spirit of art will breathe upon the thing of use, and it will become a thing of beauty.

Mr. Sard said he was sure that all those present had been very much entertained, as well as instructed by the paper read by Mr. Bayles. It showed great care and research in its preparation, and he was sure all the members would wish to have it preserved in permanent form, so that it might be studied. He moved that the thanks of the association be extended to Mr. Bayles and that his address be made a part of the minutes. Carried.

The Secretary read an obituary of Mr. J. S. Peckham, of Utica, the only member who had died since the last meeting. Suitable action was taken.

The Chair appointed Messrs. Hill, Sard, Anthony, Perry and Bradley a committee to prepare business for to-morrow (Thursday).

Gen. Rathbone, as Chairman of the Committee on Convict Labor, made a report to the effect that an effort to secure a favorable consideration by the Legislature of New York, of the resolution of the association, asking that the number of convicts employed in any one industry be limited to 10 per cent. of the total number, had failed, chiefly through the hostility of the Speaker of the Assembly. He hoped that the effort would be more successful next winter. His report was accepted, and Mr. Sard



# The Iron Age Directory

and Index to Advertisements.

Alphabetical	Page
Agricultural Implements	1
Johnson, G. & Co., Oswego, N. Y.	1
Wheeler & Melick Co., Albany, N. Y.	1
Air Compressors	2
Clayton Steam Pump Works, 14 and 16 Water st., Brooklyn, N. Y.	2
Alarm Money Drawers	3
Miles & Co., Providence, R. I.	3
Tucker & Dorsey, Indianapolis, Ind.	3
Anti-Friction Metals	4
Du Plaisir & Co., Philadelphia	4
Reeves Paul S., Philadelphia	4
Architectural Iron Work	5
Fincher & Norris, Trenton, N. J.	5
Zeina Iron Co., 86 Gore St., N. Y.	5
Angers, B. & Co., Westfield, Mass.	6
Clark Wm. A., Westfield, Mass.	6
Conn. Valley Hdw. Co., 98 Chambers, N. Y.	6
Small Mfg. Co., Albany, N. Y.	6
Architectural Iron Work	7
Clark & Sons, Westfield, Mass.	7
Hotchkiss Guy C., Field & Co., 52 E. 14th, N. Y.	7
Lambertville Iron Works, Lambertville, N. J.	7
Shelton & Co., Auburn, N. Y.	7
Babbit Metals	8
Philadelphia Smelting Co., 12th and Noble, Phila.	8
Barb Wire	9
Tuley Wire Hedge Co., 34 Canal, Chicago, Ill.	9
Bellows, Manufacturers of	10
Scott Geo. M., Chicago, Ill.	10
Bells (Sleigh)	11
Brown Bros. Mfg. Co., Easthampton, Conn.	11
Belted, Makers of	12
Alexander Bros., 412 N. 3d, Philadelphia	12
Forrester Wm. J., 37 Park Row, N. Y.	12
N. Y. Belting and Packing Co., 37 Park Row, N. Y.	12
Bird Cages, Makers of	13
Landman O. & Co., 254 Pearl, N. Y.	13
Maximilian Mfg. Co., N. Y.	13
Blitz Braces, Manufacturers of	14
Beck & Co., 102 Chambers, N. Y.	14
Fray & Pizz, Bridgeport, Conn.	14
Hilliers & Sons, N. Y.	14
Blind Awning Fixtures	15
Boston Blower Co., Boston, Mass.	15
Blacks, Tacklers, Makers of	16
Burr & Co., 37 West Slip, N. Y.	16
McMillan Wm. H. & Co., 113 South, N. Y.	16
Penfield Block Works, Lockport, N. Y.	16
Providence Tool Co., Providence, R. I.	16
Bolt Cutters	17
National Bolt and Pipe Mach. Co., Cleveland, O.	17
Rockwell Screw and Machine Co., Cleveland, O.	17
Wiley & Russell, Greenfield, Mass.	17
Bolts (Screw)	18
Coleman Eagle Bolt Works, Philadelphia	18
Boat and Shoe Heel Stiffeners	19
Lyons N. Albany, N. Y.	19
Boat Hauls, Makers of	20
Tibbitt W. & J., 200 Pearl, N. Y.	20
Boats, Manufacturers of	21
Ansonia Brass and Copper Co., 10 Cliff, N. Y.	21
Bridgeport Brass Co., Bridgeport, Conn.	21
Brass Goods Mfg. Co., 43 Chambers, N. Y.	21
David John & Sons, N. Y.	21
Holmes, Booth & Haydens, 49 Chambers, N. Y.	21
Manhattan Brass Co., 81 Reade, N. Y.	21
Merchant & Co., 52 Market st., Phila.	21
Plume & Atwood Mfg. Co., 80 Chambers, N. Y.	21
Seavill Mfg. Co., 421 Broome, N. Y.	21
Waterbury Brass Co., 22 Broadway, N. Y.	21
Brass Founders	22
Reeves Paul S., Philadelphia	22
Brick Machines	23
Gregg Brick Co., Walnut, Philadelphia	23
Miller S. F. & Co., 325 Fifth, Phila.	23
Bridge Builders	24
Mosley Iron Bridge and Roof Co., 1 Day, N. Y.	24
Butcher and Shoe Knives, Manufacturers of	25
Wilson John, Springfield, Mass.	25
Butts and Hinges	26
American Spiral Spring Butt Co., 82 Beekman, N. Y.	26
Sabin Mfg. Co., Montpelier, Vt.	26
Stanley Works, New Britain, Conn.	26
Union Mfg. Co., 98 Chambers, N. Y.	26
Townsend, W. & Hubbard, Philadelphia	26
Carriage Hardware, Makers of	27
Pim Richard P., Wilmington, Del.	27
Smith H. D. & Co., Philadelphia, Conn.	27
Wilcox & Howe, Birmingham, Conn.	27
Carriage Springs	28
Dexter Spring Co., Hutton, Pa.	28
Car Axles	29
Robert A. & P. Co., 265 S. 4th, Philadelphia	29
Car Wheels	30
Whitney A. & Sons, Philadelphia	30
Casters	31
Phoenix Caster Co., Indianapolis, Ind.	31
Caustic Irons	32
Carver John, 288 Monroe, N. Y.	32
Chisels, Manufacturers of	33
Buck Bros., Millbury, Mass.	33
Chisels, Manufacturers of	34
Chisholm, A. F., Hartford, Conn.	34
Chisels, Manufacturers of	35
E. P. Sutton & Co., 26th, N. Y.	35
Clock Springs, &c.	36
Gary & Moen, 234 W. 25th, N. Y.	36
Dunbar Bros., 120 Canal, N. Y.	36
Clothes Pin (Metallic)	37
Brower J. L. & Son, 286 Greenwich, N. Y.	37
Coal, Makers of	38
Fardon, A. & Co., 111 Broadway, N. Y.	38
Tennessee Coal & Railroad Co., Tracy City, Tenn.	38
The Hoboken Coal Co., Jersey City, N. J.	38
Coal Vases	39
Shepard Sidney & Co., Buffalo, N. Y.	39
Coffee and Spice Mills	40
Lane Brothers, Millbrook, N. Y.	40
Enterprise Mfg. Co., Philadelphia, Pa.	40
Coke	41
Winter Francis, 230 S. Third, Phila.	41
Compasses and Dividers, Manufacturers of	42
Bemis & Call Hdw. & Tool Co., Springfield, Mass.	42
Copper	43
Reynolds & Co., 507 Market st., Phila.	43
The New Haven Copper Co., 215 Pearl, N. Y.	43
Corn Huskers	44
Chambers, Boring & Quinlan, Decatur, Ill.	44
Corn Shellers	45
The Gouds Mfg. Co., Seneca Falls, N. Y.	45
Corrugated Iron	46
Mosley Iron Bridge and Roof Co., 5 Day, N. Y.	46
Cradles, Crin.	47
Grant Pat. Mfg. and Cradle Co., Melrose, N. Y.	47
Crucibles, Manufacturers of	48
Wils, Siedel & Co., 707 Market, Phila.	48
Cutlery, Importers of	49
Boyer Hermann & Co., 101 Duane, N. Y.	49
Clatworthy F. & Co., 30 Chambers, N. Y.	49
Fisher Jos. S., 41 Commerce, Phila.	49
Friedmann & Lantiering, 14 Warren, N. Y.	49
Cutlery, Manufacturers of	50
Burkman Aaron, Peppercorn, Mass.	50
Goodell Company, Antrim, N. H.	50
John Russell, Cutlery, N. Y.	50
Marx Bros., 120 Broadway, N. Y.	50
Meriden Cutlery Co., 49 Chambers, N. Y.	50
Naugatuck Cutlery Co., 30 Chambers, N. Y.	50
Rogers Cutlery Co., Hartford, Conn.	50
The Lamson & Goodnow Mfg. Co., 88 Cham.	50
Discount Tables	51
Jennings S. H., Deep River, Conn.	51
Leitch Edw. B., St. Louis Elevator, St. Louis, Mo.	51
Door and Gate Springs	52
Dunne P. R., 15 Fulton, N. Y.	52
Van Wagoner & Williams, 82 Beekman, N. Y.	52
Door Belts	53
Van Robert B., Fair Haven, Ct.	53
Drilling Machines, Makers of	54
Thorne, De Haven & Co., Philadelphia	54
Wiley & Russell, Greenfield, Mass.	54
Drop Forgings	55
Rose Wm. & Bros., West Philadelphia, Pa.	55
Herrill C. & Son, 155 Grand, N. Y.	55
Drop Hammers	56
The Stiles & Parker Press Co., Middletown, Ct.	56
Drop Presses	57
Becher & Peck, New Haven, Conn.	57
Edge Tools, Makers of	58
Boosher M. & Co., Rochester, N. Y.	58
Gregg M. & Son, Rochester, N. Y.	58
Elevators, Makers of	59
Crane Bros., Chicago, Ill.	59
Stokes and Parrish, Philadelphia	59
Elevator Buckets	60
Loveland T. P., Brooklyn, N. Y.	60
Emery	61
Jennings S. H., Deep River, Conn.	61
Engines, Gas, Schlichter, Schumm & Co., Philadelphia	61
Engines (Locomotive)	62
Baldwin Locomotive Works, Philadelphia, Pa.	62
Engines, Steam, Makers of	63
Bradley, Seale & Co., New Castle, Pa.	63
Burden Iron Works, Troy, N. Y.	63
Condit, Wick & Co., Cleveland	63
Houdette & Ellis, Boston, Mass.	63
Kirkpatrick, Beale & Co., Pittsburgh, Pa.	63
Leoman & Co., 40 and 42 West, N. Y.	63
North Chicago Rolling Mill Co., Chicago, Ill.	63
Phoenix Iron Co., 40 Walnut, Philadelphia	63
Rome Iron Co., Chattanooga, Tenn.	63
Rome Merchant Iron Mills, Rome, N. Y.	63
Rowland James & Co., 92 N. Delaware, Phila.	63
Rowland Wadsworth & Harney, Philadelphia	63
Shoemaker & Co., Pittsburgh, Pa.	63
Taylor & Boggie, Cleveland, O.	63
Rolling Presses	64
Uster Iron Works, 90 Broadway	64

Fastenings, Self-Measuring, Makers of	65
Enterprise Mfg. Co., Pa., Phila. and N. Y.	65
Lane Bros., Millbrook, N. Y.	65
Fencing, &c.	66
Cleveland Wrought Iron Fence Works, Cleveland, Ohio	66
Files, Importers of	67
Car J. & Riley, 82 John, N. Y.	67
Fisher Joseph, 1st Commerce, Phila.	67
Moss F. W., 80 John, N. Y.	67
Files, Manufacturers of	68
Andrew File Works, 38 Chambers, N. Y.	68
Barnett & Co., 121 Richmond, N. Y.	68
Diakon Henry & Sons, Phila.	68
Draper, T. & Co., Sing Sing, N. Y.	68
Everhart James, 121 Commerce, Phila.	68
McCaffrey & Bro., 172 and 174 N. 4th, Phila.	68
New American File Co., Providence, R. I.	68
Nicholson File Co., Providence, R. I.	68
Paul Chas. B., Williamsburg, N. Y.	68
Spencer J. B. & Son, Sheffield, England	68
Filters	69
Monson M. C., Chicago, Ill.	69
Fire Brick, Makers of	70
Borgner & O'Brien, Philadelphia, Pa.	70
Brooklyn Clay Refractory and Fire Brick Works, Van Dyke St., Brooklyn, N. Y.	70
Gardner Brothers, 7th St., N. Y.	70
Hall & Sons, Perth Amboy, N. J.	70
Hall & Sons, 32 Green, N. Y.	70
Krescher B. & Sons, 23 Green, N. Y.	70
Maurer Henry, 48 East 23d, N. Y.	70
Ostrander James & Son, Troy, N. Y.	70
Valentine M. D. & Bro., Woodbridge, N. J.	70
Watson John, 300 East, N. Y.	70
Flint and Emery Paper and Cloth	71
Bader, Adamson & Co., 730 Market, Phila.	71
Fluting Machines	72
Shepard Hardware Co., Buffalo, N. Y.	72
Fluting Iron	73
Burger & Baumgard, 65 Duane, N. Y.	73
Empire Portable Forge Co., Cohoes, N. Y.	73
Fossiliferous Ores	74
Brown T. J., Rockford, Tenn.	74
Foundry, Makers of	75
Faxon J. W. & Co., 511 Beech, Phila.	75
Whitehead Bros., 417 W. 15th, N. Y.	75
Friction Clutch	76
Smith James & Co., 137 Market, Phila.	76
Fry Pans	77
N. Y. Stamping Co., 211 Avenue A, N. Y.	77
Furnaces, Makers of	78
Richmond & Fotts, 110 S. 4th, Phila., Pa.	78
Furniture Springs	79
Carey & Moen, 234 W. 25th, N. Y.	79
Haigh Lloyd J., 81 John, N. Y.	79
Galvanized Iron	80
Lefferts Marshall, 92 Beekman, N. Y.	80
Garden Tools	81
Dunlap C. W. & Co., 43 Chambers, N. Y.	81
Empire Mfg. Co., Geneva, Ohio	81
Geyers	82
Judson Junius & Son, Rochester, N. Y.	82
Grindstones	83
Wood H. S. & Co., 33 West, N. Y.	83
Wood Water E. & Co., 33 West, N. Y.	83
Workington & Sons, North Amherst, Ohio	83
Guns, &c.	84
Whitcomb Louis & Roelker, 20 Reade, N. Y.	84
Gunpowder, Makers of	85
Kneeland F. L. (DuPont) 20 Wall, N. Y.	85
Lafin & Hand Powder Co., 20 Murray, N. Y.	85
Guns, Manufacturers of	86
Goodman B. Ansonia, Ct.	86
Handles, Makers of	87
Hartigan Wm. B., Burlington, Conn.	87
Hendley & Hanks, 70 Reade, N. Y.	87
Hardware Commission Merchants	88
Heaton & Denckla, 57 Commerce, Phila.	88
Hendley & Hanks, 70 Reade, N. Y.	88
Hendley & Hanks, 70 Reade, N. Y.	88
Watbridge O. B., 103 Chambers, N. Y.	88
Hardware Dealers	89
Corby, Supple & Watson, 65 Market, Phila.	89
Shepard Sidney & Co., Buffalo, N. Y.	89
Hardware Importers	90
Baker Hermann & Co., 101 Duane, N. Y.	90
McCoyle & Co., 134 and 136 Duane, N. Y.	90
Windmiller Louis & Roelker, 20 Reade, N. Y.	90
Hardware Manufacturers	91
American Mfg. Co., 4735 Pa. Philadelphia	91
American Spiral Spring Butt Co., 82 Beekman, N. Y.	91
Coulter, Plaster & Co., 37 Chambers, N. Y.	91
Cowles Hardware Co., Unionville, Conn.	91
Enterprise Mfg. Co., Phila.	91
Lloyd, Supple & Watson, 65 Market, Phila.	91
Malby, Curtis & Co., 24 Reade, N. Y.	91
Miller's Falls Co., 72 Chambers, N. Y.	91
Payson & Co., 119 W. Jackson, Chicago, Ill.	91
Phila. Novelty Mfg. Co., 81 Cherry, Phila.	91
Russell & Erwin Mfg. Co., New York	91
Scott R. P. & Co., Newark, N. J.	91
Shannon J. B. & Sons, 100 Market, Phila.	91
Shepard Hardware Co., Buffalo, N. Y.	91
Stanley Works, New Britain, Conn.	91
Star Salt Caster Co., Boston	91
Union Mfg. Co., 98 Chambers, N. Y.	91
Van Wagoner & Williams, 82 Beekman, N. Y.	91
Hardware Specialties	92
American Machine Co., 125 N. 4th, Phila.	92
Shepard Sidney & Co., Buffalo, N. Y.	92
Spencer & Underhill, 49 Chambers, N. Y.	92
Harness Snaps	93
Cover Mfg. Co., West Troy, N. Y.	93
Hay Knives	94
Holt Hiram & Co., East Wilton, Me.	94
Hinges	95
Lewis, Oliver & Phillips, Pittsburgh, Pa.	95
Sovill Mfg. Co., 419 Broome, N. Y.	95
Stanley Works, New Britain, Conn.	95
Hoe Ringers	96
Chambers, Boring & Quinlan, Decatur, Ill.	96
Holding Snaps, Makers of	97
Crane Bros., Mfg. Co., Chicago, Ill.	97
Davis J. & Co., Newark, N. J.	97
Holding Machines	98
Box Alfred & Co., 312 Green, Phila.	98
Clem & Morse, 415 Cherry, Phila.	98
Harrington Edwin & Son, Philadelphia, Pa.	98
Hollow Chilled Rolls	99
Town & Co., Pittsburgh, Pa.	99
Hollow Ware	100
W. T. Wells, 78 Beekman, N. Y.	100
Hose (Cast) & Bale	101
New York Handle & Mallet Works, 456 E. Houston, N. Y.	101
Horse Nails, Makers of	102
Baker Hermann & Co., 101 Duane, N. Y.	102
Anvil Nail Co., 65 Washington, N. Y.	102
Naugle Horse Nail Co., 1 Warren, N. Y.	102
Bridge Water Iron Co., Bridge Water, Mass.	102
EP Nail Co., Cleveland, O.	102
National Horse Nail, Vergennes, Vt.	102
Northwestern Horse Nail Co., Chicago, Ill.	102
Saranac Horse Nail Co., Plattsburg, N. Y.	102
Horse Shoes, Makers of	103
Burden Iron Works, Troy, N. Y.	103
Rhode Island Horse Shoe Co., Providence, R. I.	103
Schoenberger & Co., Pittsburgh, Pa.	103
Hose (Linen)	104
Eureka Fire Hose Co., 13 Barclay, N. Y.	104
Hose Cart	105
Manard & Bro., Rockford, Ill.	105
Housewarming Goods	106
Fierce Geo. N. & Co., Buffalo, N. Y.	106
Hydrants &c.	107
McLean John, 300 Monroe, N. Y.	107
McLoughlin & Hudson Mfg. Co., Watertown, N. Y.	107
Hydraulic Jacks	108
Duckworth Richard, 24 Columbia, N. Y.	108
Lyon E. & Co., 475 Grand, N. Y.	108
Ice Cream Freezers	109
Dunne P. R., 15 Fulton, N. Y.	109
White Mountain Freezer Co., N. H.	109
Ice Pies	110
Works A. A. & John, N. Y.	110
Insurance, Boiler	111
Hartford Steam Boiler Inspection and Insurance Co.	111
Iron Brokers	112
Boynton Geo., 70 Wall, N. Y.	112
Edging Edward J., Philadelphia, Pa.	112
Hatry A. G., Pittsburgh, Pa.	112
Iron Charcoal, Warm Cold Blast	113
Quincy John W., 68 William, N. Y.	113
Iron Castings, Makers of	114
Adams Hugh W., 56 Pine, N. Y.	114
Love S. B., Chattanooga, Tenn.	114
Richardson J. O., 23 Dock, Philadelphia	114
Iron, Pig, Importers of	115
Williamson James & Co., 64 Wall, N. Y.	115
Iron Dealers	116
Beck Brothers, 100 South, N. Y.	116
Bonnel, Botsford & Co., Youngstown, O.	116
Borden & Lovell, 70 and 72 Cedar, N. Y.	116
Carmichael Wm. J., 23 Cedar, N. Y.	116
Conney Daniel F., 83 Washington, N. Y.	116



moved that the committee be continued. Gen. Rathbone declined to serve as chairman.

Mr. Perry said he could speak from personal knowledge of the activity and efficiency of Gen. Rathbone as chairman of this committee, and hoped that he would be continued in the position. (Much laughter.)

By vote of the association the committee was continued, and Gen. Rathbone's resignation as its chairman was tabled.

Mr. Perry said: I could give some reasons why the employment of convict labor in the manufacture of stoves has been a great blessing to the stove manufacturers, but there are reasons which make it improper and impolitic to discuss this subject in public. There is a great deal of misconception in the minds of the trade on this subject. They say that Perry & Co. employ a thousand convicts. Well, that appears to be a large number. In molding they employ, I think, about 380. These men do not produce one-half of the amount produced by the same number of citizens; and I think I can say with truth that the 1000 men at Sing Sing, so far as the production of castings is concerned, take the place of about 150 molders. The production of 150 molders at Sing Sing will not make any material difference to the other manufacturers of the country. So far as prices are concerned, I can say with confidence that Perry & Co. have never reduced the price of stoves because they were made in Sing Sing. They have followed their competitors, as other people do, and as probably they will continue to do. We have no objection whatever to the action of this association, or any member of it, in respect to convict labor. It is an open question, and every one has a perfect right to freedom of opinion and of action. We have no feeling on this subject whatever.

Mr. Sard moved that a committee be appointed to take charge of the preparation of papers for the next meeting. Carried.

The chair announced that the committee would be appointed to-morrow.

The association then adjourned to meet to-morrow (Thursday) at 10 a. m.

An apparatus for measuring the recoil of guns during the first instants after the charge is fired, has lately been brought before the French Society for the Encouragement of National Industry, by M. Sebert. It is termed a velocimeter, and consists essentially of a strip of flexible steel soot-blackened on its upper surface, and capable of being pulled in a horizontal slide by a steel wire connected with the gun on the carriage. Above it is a tuning fork (with arms parallel in horizontal direction) kept vibrating electrically. This can be depressed so that a small steel style on one of the arms comes in contact with the strip, and as the strip is pulled along in the motion of recoil the style produces a wavy trace, from which the velocity of recoil at each moment can be accurately deduced (the rate of vibration of the fork being known). M. Sebert adds to the apparatus certain pieces whereby the duration of course of projectiles, either in the bore or in the air, can be exactly measured at the same time.

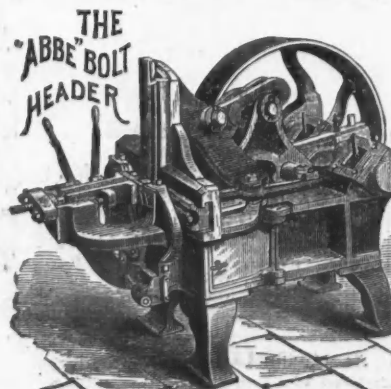
#### THE DRUM HOSE CART.

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3d. This Hose Cart is also furnished with a ratchet device to retain the reel as fast as the



hose is wound thereon; besides which it has adjustable rubber clamps to hold the different sizes of hose, and rubber clasp to grasp the nozzle, with other minor improvements, which combine to make it perfect.  
Foot A takes 100 ft. 1-in., or 150 ft. 1/2-in. Hose.  
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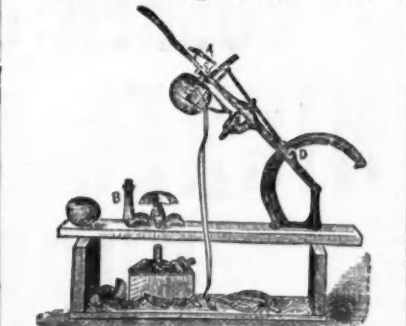


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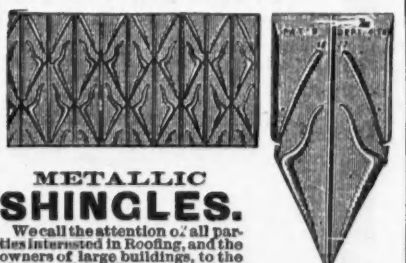
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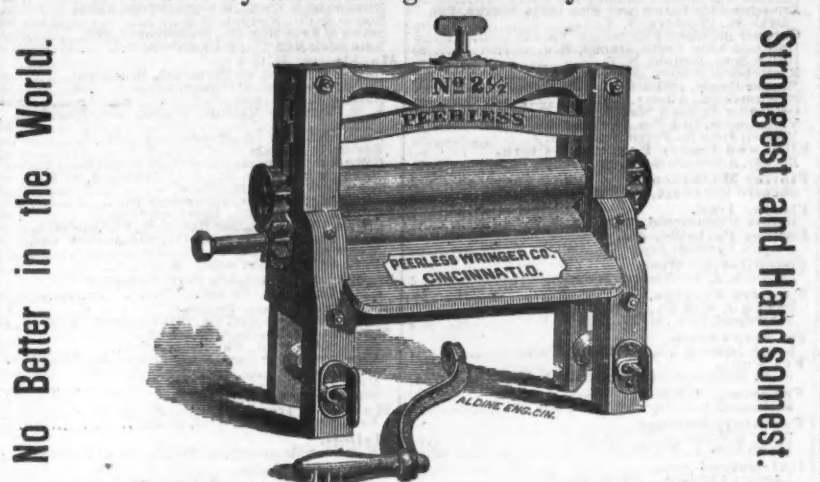
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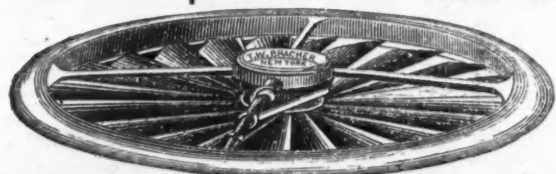
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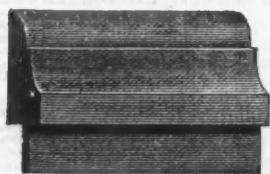
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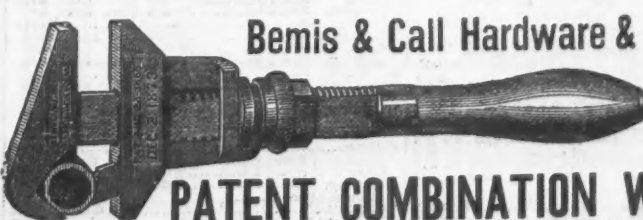
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### INTERNATIONAL EXHIBITION.

No. 235.

PHILADELPHIA, 1876.

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

#### REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: **Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.**

G. L. REED. Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,  
Jas. Bain,  
Chas. Staples,

C. L. Reed,  
J. D. Imboden,

J. Diffenbach,  
Dav. McHardy,

A true copy of the record. FRANCIS A. W. LKER, Chief of the Bureau of Awards.  
Given by authority of the United States Centennial Commission.

[L.S.] J. L. CAMPBELL, Secretary.

A. T. GOSHORN, Director-General.  
J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

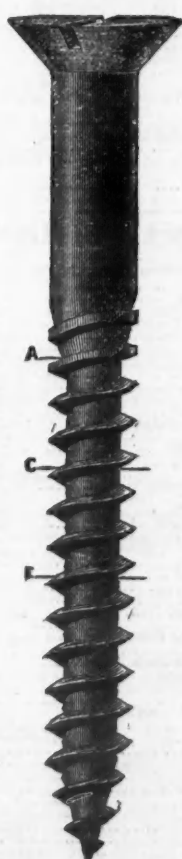
Experience has shown that the wear point of screws, as formerly made, is at the heel of the thread, where all

1776.



1846.

Patented August 30.



Section at Line A B

Section at Line C D

Section at Line E F

1876.

Patented May 30.

COVERED BY TRADE MARK.



Section at Line A B

Section at Line C D

Section at Line E F

Estimated to be FIFTY PER CENT. stronger than a Screw as Commonly made.

the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

#### CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads; substantially as described."



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FIRE BRICK**AND  
**CLAY RETORT WORKS.**

Established 1845.

Office, foot of Houston Street, East River,  
NEW YORK.The largest stock of Fire Brick of all shapes and  
sizes on hand and made to order at short notice.Cupola Brick, for McKenzie Patent,  
and others. Fire Mortar, Ground Brick, Clay and  
sand. Superior Kaolin for Rolling Mills and found-  
ries. Stone Ware and other Fire Clay and Sand,  
from my own mines at New Jersey and Staten  
Island, by the cargo or otherwise.**NEWTON & CO.,**

Successor to

**PALMER, NEWTON & CO.,**

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**FIRE BRICK**Stove Linings,  
Range and Heater Linings  
Cylinder Brick, &c., &c.**M. D. Valentine & Bro**

Manufacturers of

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DRAIN PIPE & LAND TILE.

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ESTABLISHED 1846.

**HALL & SONS, Buffalo, N. Y.**

ESTABLISHED 1866.

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Terra Cotta, Fire Clay, Fire Sand, Kaolin, Ground Fire  
Brick and Diamantine Building Brick.**Brooklyn Clay Retort**

AND

**FIRE BRICK WORKS.**Manufacturers of Clay Retorts, Fire Bricks, Ga  
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Office No. 38 Van Dyke St.**Watson Fire Brick Manufactory**

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found practiced at different times during the past few years.We refer to old or worn-out files of  
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immersing them in an acid bath, and  
afterward selling them in packages  
bearing a label of similar appearance  
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palming the same off as our original  
goods.As this fraud is of a most danger-  
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comparatively valueless for use.We warn all parties that if de-  
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our files, with the intention of trading  
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will be presented to the courts for  
treatment.All original packages of First  
Quality Files leaving our works bear  
a Green Label, a copy of which is  
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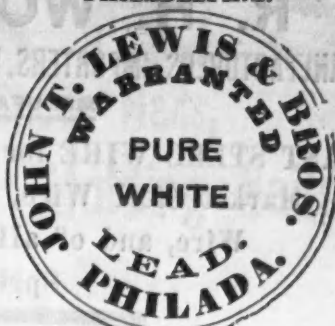
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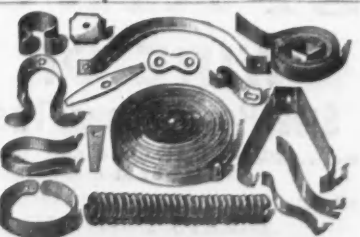
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Total Capacity per year.....	200,000 "

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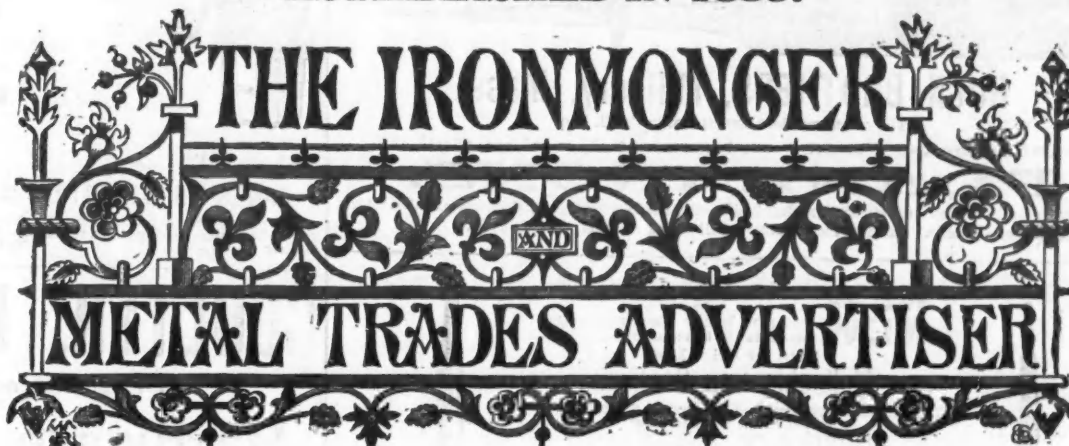
French Points, Window Shade Nails,  
Upholstering, **WAGON NAILS**, Molding Nails,  
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Electrotype, Roofing Nails,  
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Veneer Nails, Label Tacks and small Nails of all kinds, Cabinet Nails, Barbed Lock Nails, Cigar Box Nails, &c., &c., put up in bulk, 5 lb. packages: 1 lb. papers, or as wanted.

**AMERICAN WIRE NAIL CO.**  
Factory, Fifteenth and Madison Sts. COVINGTON, KY.

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THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

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## IMPORTANT NOTICE!

## Great Agricultural Show in London.

In connection with the great International Show of the Royal Agricultural Society in London, during the first week of July will be issued a full report of the proceedings, exhibits, prizes, &c., together with several contributions by acknowledged authorities on cognate subjects. The whole of this matter will be contained in a

**SPECIAL ISSUE OF THE "IRONMONGER,"**

which will not only be of large size, and compiled in the most enterprising manner, but will have an

**EXTRA CIRCULATION**

OF

**FIVE THOUSAND COPIES**

among ironmongers, agricultural implement and machinery makers, dealers, exporters, importers, &c., the world over,

IN ADDITION TO THE REGULAR SUBSCRIBERS.

The proprietors hope, in fact, to place that issue of the *Ironmonger* in the hands of every one who is interested in the manufacture or sale of these articles; therefore,

## AMERICAN MANUFACTURERS

desirous of bringing their productions *prominently and surely* before those who can influence sales, should not fail to have their advertising announcements attractively displayed in it. It is well known that American implements sell more freely in Great Britain than any other goods of transatlantic origin. Large numbers of German, French, Dutch, Belgian, Danish, Swedish, Russian and other buyers and importers are certain to visit the show, which will surpass all hitherto held in size and importance. Notwithstanding these inducements there will be

### NO ADVANCE IN THE TARIFF

on the occasion, but the usual charges (see prices below, or our ordinary weekly advertisement in *The Iron Age*) will be unaltered. All Orders and Blocks should reach us not later than July 2. We shall have an office on the Show Ground.

### ADVERTISEMENTS

are inserted in the *Ironmonger* and *Metal Trades Advertiser* at the subjoined rates, from which no variation can be made on any ground whatever.

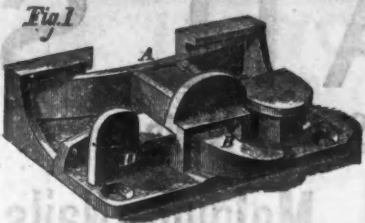
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One Advertisement of every Series of 13 Monthly, 27 Fortnightly, or 53 Weekly, will be inserted in the *Ironmongers' Diary* and Text Book, published toward the end of each year, and presented to every Subscriber.

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The Best in the Market.

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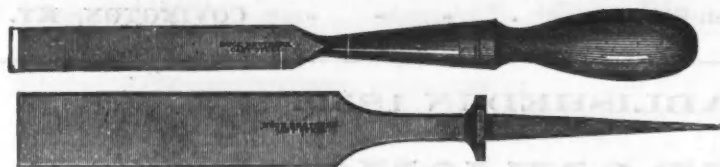


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Gouges of all lengths and circles beveled inside or outside. Nail Sets, Scratch and Belt Awn Caneel Handles of all kinds. Carving Tools. Also small Boxes of tools of best quality.



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Of superior quality, and Hardware Specialties in Malleable Iron made to order.

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PORTABLE DRILLS. Driven by power in any direction. RADIAL DRILLS. Self-feed—Large Adjustable Box Table. VERTICAL DRILLS. Self-feeding. MULTIPLE DRILLS. 5 to 20 Spindles. HORIZONTAL BORING AND DRILLING MACHINES. HAND DRILLS. CAR BOX DRILLS. SPECIAL DRILLS. For Special Work.

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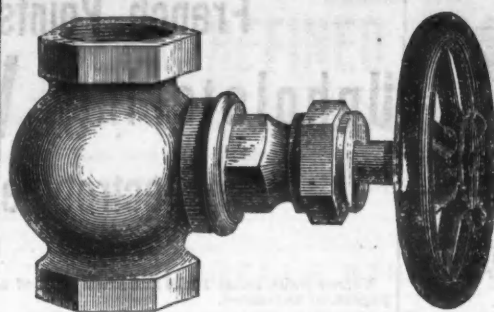
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New Illustrated Catalogue and Price List sent by express to the Trade on application.



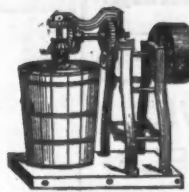
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HAND OR POWER ICE CRUSHER.

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Galvanized iron outside, tin inside. No secretions of oxide of zinc need be feared in the use of this freezer. Simple in construction, perfect in results. Send for descriptive circular and discounts of this celebrated freezer. Address WHITE MOUNTAIN FREEZER CO., Laconia, N. H.

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IMPORTANT FOR ALL LARGE CORPORATIONS AND MANUFACTURING CONCERNS.

Capable of controlling with the utmost accuracy the motion of a watchman or patrolman as the same reaches different stations of his beat. The instrument is complete in itself, portable and as reliable as the best lever watch. It requires no fixture or wires communicating from room to room, as is the case with the ordinary watch clocks. A small, inexpensive stationary key is alone required at each station. The instrument will, in all cases, be warranted perfect and satisfactory.

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WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting peat and ditching marches.

The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and it seems destined to take the place of all other Hay Knives.

They are nicely packed in boxes, one dozen each, of 50 lbs. weight, suitable for shipping by land or water to any part of the world.

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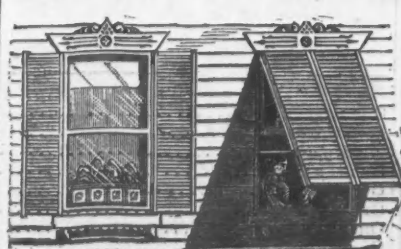
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For sale by the Hardware Trade generally.

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## Dearborn's Pat. Adjustable Blind Awning Fixtures.



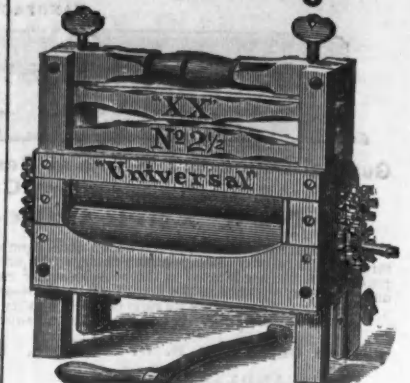
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Improved with Rowell's Double Cog-Wheels on both ends of each roll.

Over 500,000 sold!

And now in use, giving "Universal" satisfaction

EVERY WRINGER WARRANTED.

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Sold by the Principal Jobbers in Hardware and House-Furnishing Goods everywhere.

Special rates given for export.

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Sole Manufacturers of CARR'S PATENT Water Closets, PUMPS, CABINET WOOD WORK, &c.

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## Cast Iron Pipe

FOR WATER AND GAS.

Lamp Posts, Valves, &c., Mathew's Pat. Anti-Freezing Hydrants.

400 CHESTNUT STREET.



## The Patent Combined Dinner-Pail and Lantern.

The most perfect Dinner Pail in the world. Hot coffee for dinner and a Lantern at night.

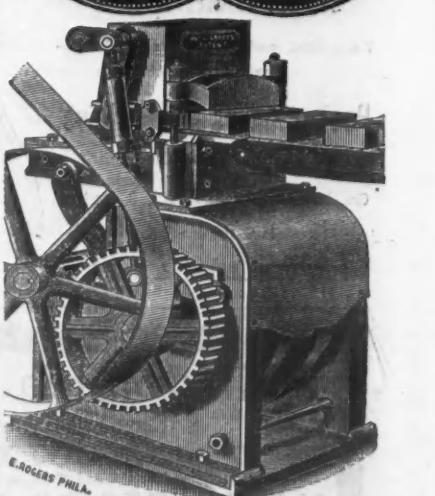
Manufactured by J. S. HAIGHT,

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Sent by express on receipt of \$2.00. Special attention given to export orders. Traveling Agents Wanted.

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"Masterpieces Centennial Exposition, 1876."




Awarded Highest Prize Paris Exposition, 1876. The above is a cut of Gregg's No. 2 Brick Machine, simple, strong and efficient, for making and re-pressing bricks. Gregg's Triple Pressure Brick Machines, Gregg's Combination Brick Machines, Gregg's Steam Power Re-pressing Machines, Gregg's Hand Power Presses. Agents wanted in every city and town. Send for catalogue. GREGG BRICK CO., 402 Walnut St., Philadelphia, Pa.



## THE BEST HEATERS IN THE WORLD

**HEALTH,**  
**TUBULAR,**  
Ample Discounts to the Trade.



**HYGEIAN,**  
**PERFECT.**  
Special Rates to Agents.

MANUFACTURED BY

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**AXLES, SPRINGS, TOOLS, MACHINERY, CARRIAGE MAKERS' SUPPLIES,**  
Manufactured and sold by  
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**Sunny Side Stove Polish.**  
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All Belts Warranted. Orders by Post immediately attended to.



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#### BIT STOCK DRILLS,

Drills for Coes, Worcester, Hunter and other Hand Drill Presses. Beach's Patent Self-Centering Chucks, Center and Adjustable Drill Chucks, Solid and Shell Reamers. Drill Grinding Machines. Taper Reamers, Milling Cutters and Special tools to order.

**All Tools exact to Whitworth Standard Gauges.**

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OFFICE, 81 Canal Street, Providence, R. I.      WORKS at Valley Falls, R. I.  
Manufacturers of  
PERKINS and RHODE ISLAND PATTERNS of  
**HORSE AND MULE SHOES,**

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Steel.	
Square, Flat and Octagon Tool Steel.	
¾ to 2 in. ....	75c and 4½ 5 in. ....
2 to 3 in. ....	100c and 4½ 6 in. ....
3½ and 4 in. ....	140c and 4½ 7 in. ....
4½ to 5 in. ....	150c and 4½ 8 in. ....
Single and Double Shear Nippers—Same as Tool.	
Knife, Trip, Dip and other sizes ....	120c
Machinery Steel—Round.	
¾ to 2 in. ....	7c
2 to 3 in. ....	7c
3½ and 4 in. ....	7c
4½ to 5 in. ....	7c
5 to 6 in. ....	7c
6 to 8 in. ....	7c
8 to 10 in. ....	7c
10 to 14 in. ....	60c
Cast Spring Steel.	
1 to 4 in. ....	50c
4 to 6 in. ....	50c
6 to 8 in. ....	50c
8 to 10 in. ....	50c
10 to 14 in. ....	50c
14 to 20 in. ....	50c
20 to 24 in. ....	50c
24 to 30 in. ....	50c
30 to 36 in. ....	50c
36 to 42 in. ....	50c
42 to 48 in. ....	50c
48 to 54 in. ....	50c
54 to 60 in. ....	50c
60 to 66 in. ....	50c
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102 to 108 in. ....	50c
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570 to 576 in. ....	50c
576 to 582 in. ....	50c
582 to 588 in. ....	50c
588 to 594 in. ....	50c
594 to 600 in. ....	50c
600 to 606 in. ....	50c
606 to 612 in. ....	50c
612 to 618 in. ....	50c
618 to 624 in. ....	50c
624 to 630 in. ....	50c
630 to 636 in. ....	50c

Pipe Mills Castings, small size	.....	3	c
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Spir and Bevel Wheels, large	.....	6	c
Engines up to 10 inches	.....	3	c
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"                    " heavy	.....	3	c
<b>Chilled Rods.</b>			
6 to 7 y'n diam.	7 to 8 y'n diam.	8 to 10 y'n diam.	10 to 12 y'n diam.
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
<b>Heavy Hardware.</b>			
Bolts, Screws, Nuts, etc.			
Lewis, Oliver & Phipps	Standard List		
Carriage & Tire Bolts, ordinary orders	75 c 50¢ off net		
over 100 lbs.	50 c 50¢ off net		
Machine and Square Head Bolts	50 c 50¢ off net		
Couch and Lag Screws	50 c 50¢ off net		
Washers	50 c 50¢ off net		
Flat, Hot Pressed Sq. and Hex. Nuts	50 c 50¢ off net		
Washers, all made from new brand iron	50 c 50¢ off net		
and Washers in lots less than one keg each size, 10¢	50 c 50¢ off net		
Extra Large and T Hinges	50 c 50¢ off net		
Harrow Teeth	50 c 50¢ off net		
Keen	50 c 50¢ off net		
Iron Washers	50 c 50¢ off net		

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allowed, but not otherwise.

**Window Glass.**  
*Per Box of 30 Feet.—Discount 75 at 7x10 5/8.*

**Single Strength.**

Size.	A. A.	B.	C.
8 to 10 x 12 1/2	\$6.75	\$6.75	\$6.75
10 to 12 1/2 x 14	8.50	7.75	8.50
12 1/2 to 14 x 16	10.75	9.75	8.75
14 to 16 x 18	12.50	11.50	7.75
16 to 18 x 20	13.50	11.50	9.75
18 to 20 x 22	14.50	13.50	10.75
20 to 22 x 24	15.00	14.00	11.50
22 to 24 x 26			
24 to 26 x 28			
26 to 28 x 30			
28 to 30 x 32			
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190 to 192 x 194			
192 to 194 x 196			
194 to 196 x 198			
196 to 198 x 200			
198 to 200 x 202			
200 to 202 x 204			
202 to 20			

As additional to per cent. will be charged for all sizes more than 40 inches wide. All sizes above 52 inches height will not make more than 24 units included. Freight will be charged in the 54 united inches bracket.

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(The Chicago Stamping Co., 10, 12 & 14 Lake St.)

March 8, 1878.

<b>Tin Plates.</b>									
10214 I.C.	Ch'l Best.	7 25	DC 10. XXXX.	"	"	Ch'l Best.	11 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	13 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	15 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	17 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	19 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	21 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	23 25		
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10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	29 25		
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10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	35 25		
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10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	47 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	49 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	51 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	53 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	55 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	57 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	59 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	61 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	63 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	65 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	67 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	69 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	71 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	73 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	75 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	77 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	79 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	81 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	83 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	85 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	87 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	89 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	91 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	93 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	95 25		
10214 I.C.	"	9 25	DC 10. XXXX.	"	"	"	97 25		
10214 I.C.	"								

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**YATT'S PATENT SPRING BOLT.**




Patented Jan. 29th, 1878.

For Fastening Cabinet Wares, Closet and House Doors, &c.

We call the attention of the trade to these Wrought Brass and Iron Bolts, as being the best and cheapest in the market. Sizes, two inches and upward, both plain and neck bolts. Two screws fasten the bolt and bed-plate to the wood; no others are required; the bed-plates are made of brass, from which the spring is cut and raised, upon which the bolt slides with easy, elastic movement, saving expense of screw, and producing a strong, handsome and cheap Bolt. Price list furnished on application.

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We also manufacture all kinds of Brass and Tin



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CRANK PIN MACHINE,for turning off Crank Pins in position and while the  
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could be without it. Manufactured and for sale in  
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Descriptive circular on application.**

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**CORRUGATED AND CRIMPED IRON**  
**ROOFING & SIDING,**  
*Iron Buildings, Roofs*  
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HEALTH,  
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**Morse Twist Drill and**  
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**All Tools exact to Whitworth's**

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**HYGEIAN,  
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Special Rates to Agents.

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**Manufacturing Co.,**  
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**CARRIAGE MAKERS' SUPPLIES,**  
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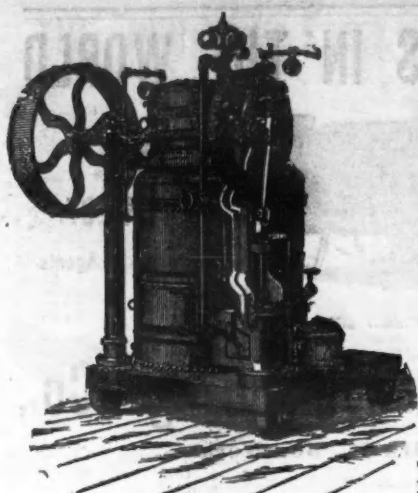
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AND PATTERNS of  
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## SHAPLEY ENGINE.

Patented Feb. 10, 1874.  
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Compact, Practical, Durable and Economical.

Acknowledged to be the best in use. This boiler stands unrivaled.

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**SHAPLEY & WELLS,**

Binghamton Iron Works,  
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Stationary Engines and Boilers.

Also Machinery for Mills of all kinds and Tanneries. Also their celebrated Bark Mills, acknowledged to be the best. Send for reduced price list circular.

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## Patent Anti-Friction Hoisting Block.

For hoisting Coal, Ore, Ice, or other heavy work, where Steam or Horse power is used. Made of Galvanized Iron and Steel, and not affected by exposure to weather.

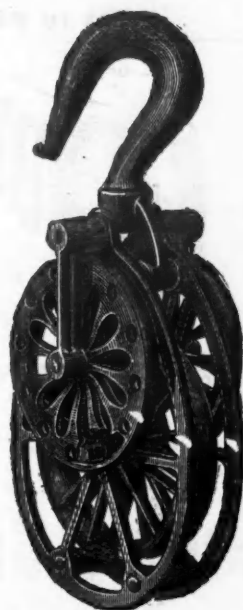
Twenty-four feet hoist turns the friction wheels on the side around once.

The Block uses 3 inch to 4 inch rope, and will sustain with safety a load of 4 tons.

Will run either end up, or on its side. The lightest running and most durable Block yet produced.

Satisfaction guaranteed. Try one.

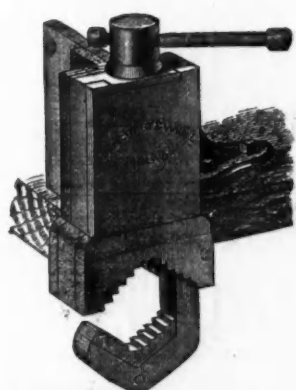
Send for Price List of Blocks.



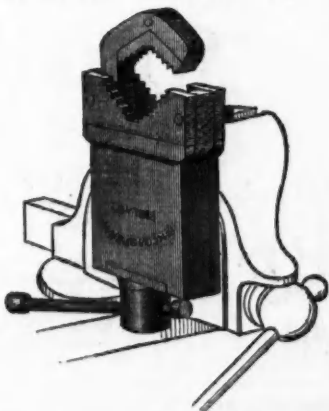
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PROVIDENCE, R. I.

## IMPROVED PIPE-FITTERS' VISE.



STRONG,  
LIGHT,  
EFFICIENT,  
CHEAP.



To meet the requirements of the large number of persons who have use for such an article, we invite attention to our Improved Pipe Vise. This Vise can be used either as a permanent fixture to work bench, attached to angle plate or can (unlike others) be held between the jaws of any Machinist's or Blacksmith's Vise; the movable jaw being OPEN ON SIDE permits work to be gripped at any desired point without slipping it in from end, and allows of FITTING BEING HELD securely; the Box is made of Malleable Iron, the Screw of Wrought Iron, and the remainder of Solid Steel throughout. The Steel Gripping Jaws can be duplicated and replaced at any time when worn out. It is a very convenient tool, well adapted to the wants of Plumbers, Pump Fitters, Well-Drivers, and all who have use for a tool that is strong, light, efficient and cheap which can be readily carried about with kit of tools.

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Manufacturers of

WARRANTED CAST STEEL

## SAWS

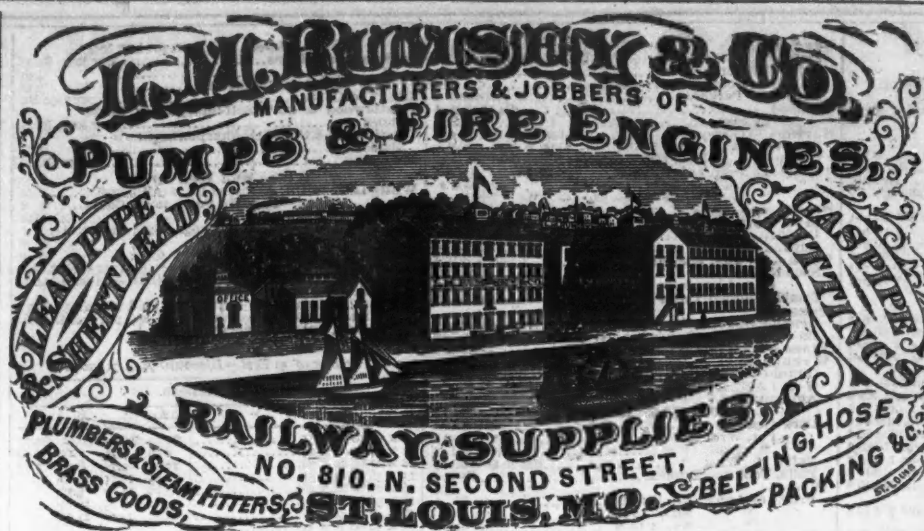
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**WOOD SAWS, Etc., Etc.**

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**PERFORATED CROSS-CUT SAWS**  
And SOLID SAWS of all kinds. Trenton, N. J.

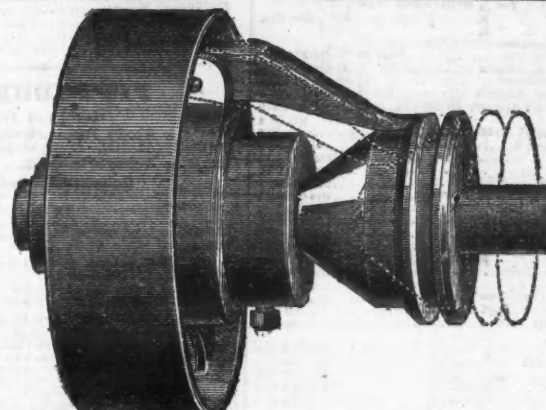
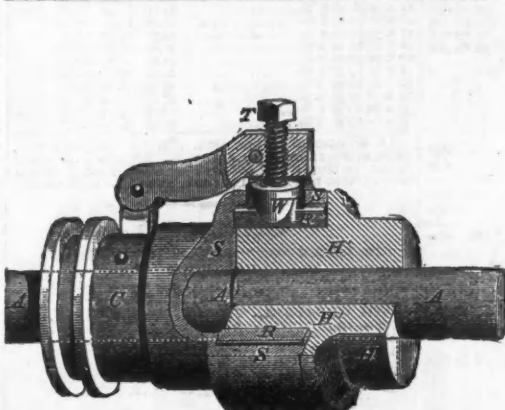


Manufacturers of GALVANIZED PUMP CHAIN FOR CHAIN PUMPS.



PATENT  
Expanding, Self-Draining  
RUBBER BUCKET.

Manufactured only by  
**L. M. RUMSEY & CO.**



## PATENT HUB FRICTION CLUTCH.

Manufactured by the HUB FRICTION CLUTCH CO., Limited, Philadelphia.

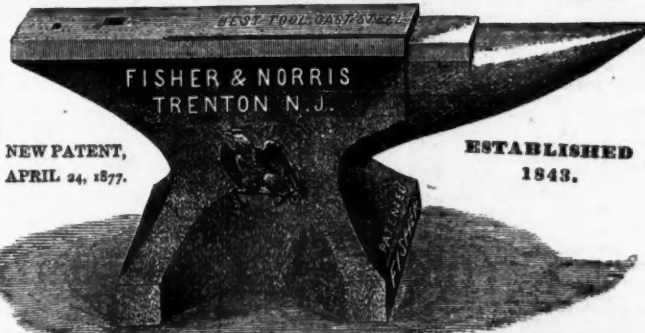
We claim for this device the following advantages for a perfect clutch, it having been adopted by several of the leading manufacturers of machinery and machinists' tools: It works easily but effectively. It works instantly and without noise. It is very durable, and is extremely simple and cheap, and has proven itself to be the best clutch in the market. Special arrangements can be made with leading manufacturers for the adoption of this clutch for their own tools. This clutch can and will be sold for less money than any other clutch in the market.

For sale by Geo. V. Carsson, Philadelphia; Morrow, Reed & Co., Baltimore.

H. S. MANNING & CO., New York Agents, 111 Liberty Street

JAMES SMITH & CO., Mfg. Agents, 137 Market Street, Philadelphia.

## THE "EAGLE." (PRICES REDUCED.)



NEW PATENT,  
APRIL 24, 1877.

ESTABLISHED  
1843.

New York—RUSSELL & ERWIN MANUFACTURING COMPANY, H. DURRIE & CO., TENNIS & WILSON.  
Philadelphia—JAMES C. HAND & CO. Boston—GEORGE H. GRAY & DANFORTH.  
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Louisville—W. B. BELKNAP & CO. Cincinnati—POST & CO. Cleveland—THE LAKE ERIE IRON CO.

## WARRANTED!!

Better than the best English Anvil.

Face in one piece, of BEST TOOL CAST STEEL. PERFECTLY WELDED, perfectly true; of hardest temper and never to come off or "settle." Horn of tough untempered steel, never to break or bend. It does not bounce the hammer back, and therefore can do more work with lighter hammer. Only Anvil made in United States fully warranted as above. None genuine without our trade mark.

New Price List, April 1, 1879.

ANVILS weighing 100 lbs. to 800 lbs., 9 cents per lb., with special discounts to the trade.

SMALLER ANVILS ("MINIMS").

No. 00 0 1 2 3 4 5 6 7 8 9 lbs.  
Weighing about 5 10 15 20 30 40 50 60 70 80 90 lbs.  
\$2.25 2.75 3.25 4.00 4.50 5.25 6.00 6.50 7.25 8.00

N. B.—These are the RETAIL PRICES. The only additional cost will be the freight to the purchaser's place of residence.

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## HOLROYD & CO.,

Waterford, N. Y.



## CLARK'S PATENT EXPANSIVE BITS

Made of JESSOP'S BEST CAST STEEL, and warranted superior to any other  
Two sizes: Large Size Boring,  $\frac{1}{4}$  to 3 inches; Small Size Boring,  $\frac{1}{8}$  to  $1\frac{1}{4}$  inches.



Manufactured by

**WILLIAM A. CLARK,**

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THE

## "Ramsay Improved Steam Winder,"

Manufactured by

**H. A. RAMSAY & CO.,**

Vulcan Iron Works,

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## ZERO REFRIGERATOR,



WITH  
Water, Wine and Milk  
Cooler.

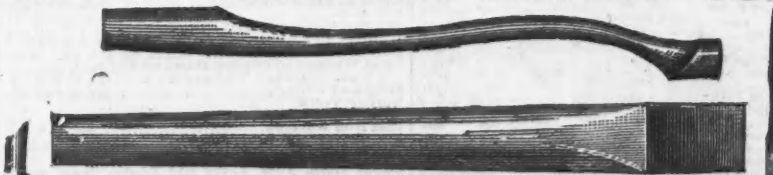
The best Meat, Fruit  
and Ice keeper in the  
world. 35,000 in use.  
Grand Centennial  
award.

ALEX. M. LESLEY, 379 Sixth Av., N. Y.  
Send for Catalogue.

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## NORTH CAROLINA HANDLE CO.



MANUFACTURERS OF

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## "THE BOSS" JACK-SCREW.

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Sole manufacturer of the above Screw. Indorsed by builders, railroad and mining men as the best screw jack in the market. Also manufactures Press Screws, Lard and Wine Presses, Tackle Blocks, &c. Circulars and prices, address as above. (Please say The Iron Age.)











## ELEVATORS.

PASSENGER ELEVATORS,  
FREIGHT ELEVATORS,  
HYDRAULIC ELEVATORS.

Hydraulic Elevators to Run from City Pressure.  
Condensed Air and Hydraulic Elevators Operated  
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Independent Steam Elevators.  
Belt Power Elevators.  
Portable Hoisting Machines.

All Kinds of Hoisting Machinery a Specialty.

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20, 22, 24 and 26 Artisan Street, New Haven, Conn., U. S. A.

Automatic machines to straighten and cut wire of all sizes to any length; to cut and mill wire for butt pins, bolt shanks and similar articles; to make all kinds of staples, with either square, flange, chisel or shear points; to roll points on picture nails and similar articles without heat; to cut and form wire into various shapes and sizes, such as rings, buckles, fence bars and similar articles; to make spiral springs; and for other special purposes to order.

Machines to straighten and cut wire by hand; to rivet together articles of hardware; to drill butts and other hardware; to mill butts; to drill or countersink several holes at once, close together or far apart, on a regular or irregular line; to drill, tap, mill and thread small articles of hardware, such as thumb screws, thumb nuts, &c.; to spin plain or ornamental caps on picture nails, tassel hooks, &c.; for grinding, buffing and polishing; to drive screws into locks, knobs, &c.; foot and hand presses and special power presses to order.

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For Attachment to Lathes, &c.



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THE GREEN RIVER TIRE UPSETTER.

### LIGHTNING

Screw-Cutting Machinery and  
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Lightning Screw Plates,  
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Drills,  
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Tire Measuring Wheels, &c., &c.  
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Manufacturer of the largest variety of Chucks in the world.  
Agents wanted.



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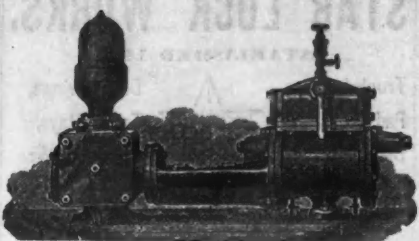
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Double and Single Gate, 1/4 in. to 48 in.—outside and inside Screws, Indicator, &c.  
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.



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### "SPECIAL" STEAM PUMP

Is the Standard of Excellence at Home and Abroad.

For reduced price lists address A. S. CAMERON, East 23rd Street, New York.

## Babcock & Wilcox Water-Tube Steam-Boiler

OVER 35,000 HORSE-POWER NOW IN USE. ADAPTED FOR ALL PURPOSES.

### SAFETY FROM

In Sections Easy of Transportation.  
No Bolted, Screwed or Packed Joints.  
All Joints Made by Expanding Wrought  
Iron Tubes into Bored Holes.  
Can be Erected or Repaired by Ordinary  
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Easily Cleaned from Soot or Sediment.  
Adapted to all kinds of Fuel.  
Steady Water Line and Dry Steam.  
No Leaks from Unequal Expansion.  
Rapid Steaming.  
Highest Attainable Economy.

CENTENNIAL EXPOSITION MEDAL AWARDED THIS BOILER FOR HIGHEST ECONOMY AND EFFICIENCY ON TEST.  
Illustrated Circulars and other desired information promptly furnished.

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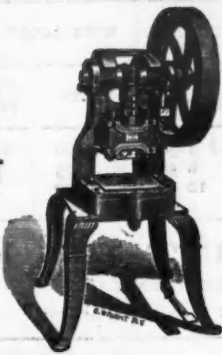
MANUFACTURERS OF ALL KINDS OF

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FOR  
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FRUIT & other  
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BROOKLYN, N. Y.,  
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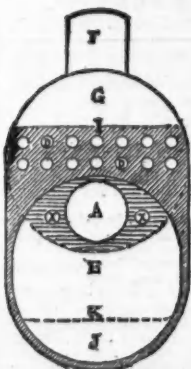
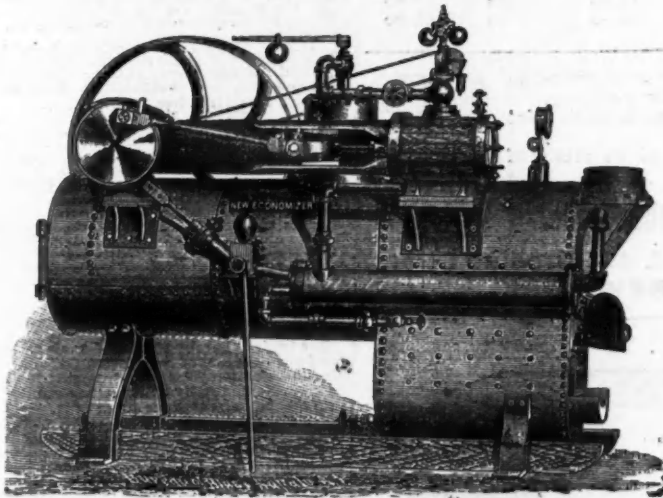
Catalogues in Eng-  
lish, French and German  
sent on application, in  
which prices are computed  
in dollars, pounds, francs  
and reichsmarks.



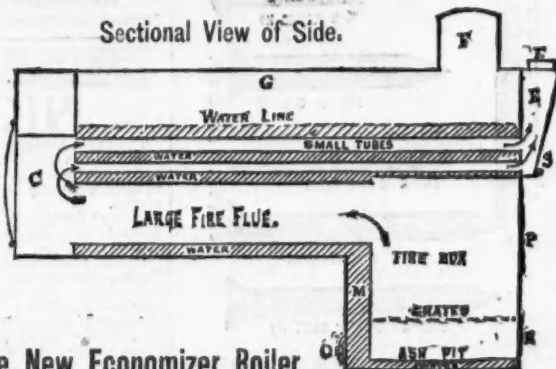
PARIS EXPOSITION, 1878.

## THE NEW ECONOMIZER,

The Only Agricultural Engine with Return Flue Boiler in Use.



Sectional View of End.



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The New Economizer Boiler.

This Boiler contains all the good points of an ordinary locomotive boiler; the fire-box is entirely surrounded by water, and the flames pass through the large fire-flue almost in a body. There is no obstruction whatever to the draft.  
The returning of the flames through the small tubes compels the deposit of the great body of sparks in the chamber at rear (C).  
We claim it is the safest boiler in the market, there being almost entire immunity from sparks, on account of the return flue idea.  
It is the best steaming boiler made, and we will invite competition with any first-class maker. It will make more steam with the same fuel than any horizontal boiler built.  
Send for Price Lists.  
We invite correspondence, and will furnish full circulars, photographs, &c., on application.

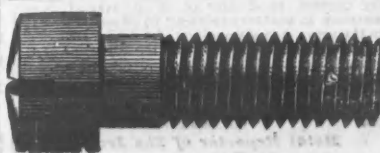
**PORTER MANUFACTURING COMPANY, Limited,**  
Syracuse, N. Y.

## LANE & BODLEY CO.,

MANUFACTURERS OF

### STEAM ENGINES, SAW MILLS AND MINING MACHINERY.

LANE & BODLEY COMPANY, Cincinnati, Ohio.

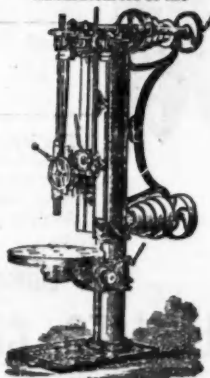


TURNED  
MACHINE SCREWS,  
One-sixteenth to five-eighths diameter.  
Heads and points to sample.  
IRON, STEEL and BRASS.  
Lyon & Fellows Mfg. CO.,  
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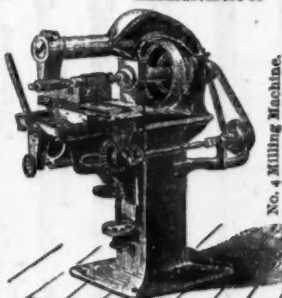


### "BLAISDELL" UPRIGHT DRILLS

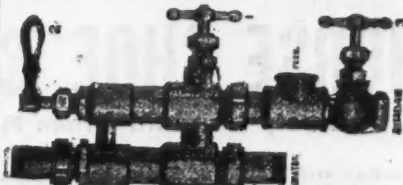
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## E. E. GARVIN & CO.

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Cornell's Building, NEW YORK.  
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New Combined Pump and Injector.

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Punching Presses, Hand Drilling Machines, Ratchet  
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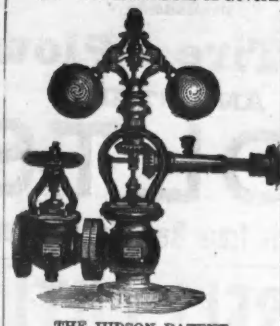
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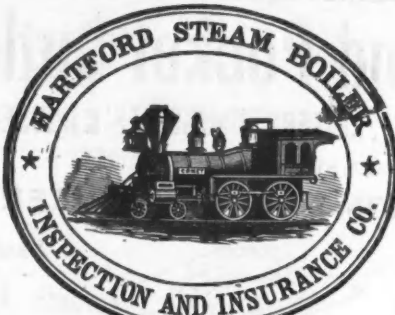
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No Charge for Boxing or Cartage.

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1 1/2	16.00	18.00	1.90	....
1 3/4	18.00	20.00	2.00	....
2	20.00	23.00	2.25	....
2 1/4	23.00	27.00	2.50	\$6.00
2 1/2	27.00	31.00	2.75	7.50
2 3/4	30.00	34.00	3.00	9.00
3	35.00	41.00	3.50	11.00
3 1/4	40.00	46.00	3.75	12.00
3 1/2	45.00	52.00	4.00	14.00
3 3/4	50.00	58.00	4.50	17.00
4	54.00	62.00	5.00	21.00
4 1/4	60.00	70.00	5.50	25.00
4 1/2	64.00	74.00	6.00	31.00
4 3/4	70.00	80.00	6.50	37.00
5	77.00	88.00	7.00	43.00
5 1/4	84.00	96.00	8.00	50.00
5 1/2	91.00	104.00	9.00	60.00
5 3/4	100.00	114.00	10.00	75.00
6	110.00	125.00	12.00	....



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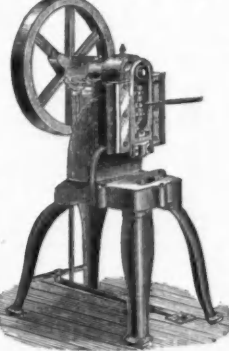
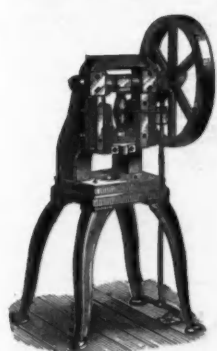
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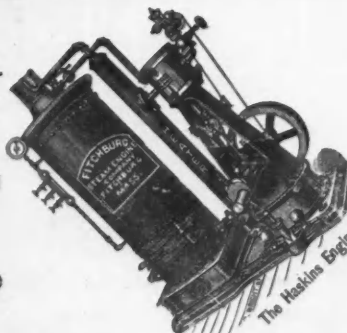
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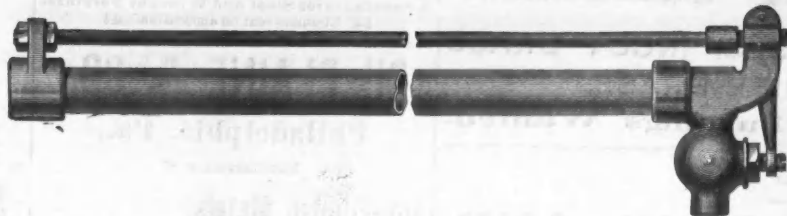
To Lift.	To Raise.	Price.	Ex. Ft.
8 ft.	500 lb.	\$22 50	\$1 00
8	1,000	25 00	1 20
8	2,000	30 00	1 50
8	3,000	40 00	1 75
9	4,000	60 00	2 00
10	5,000	75 00	2 20
10	8,000	95 00	2 40
12	12,000	150 00	3 75
12	16,000	225 00	4 75
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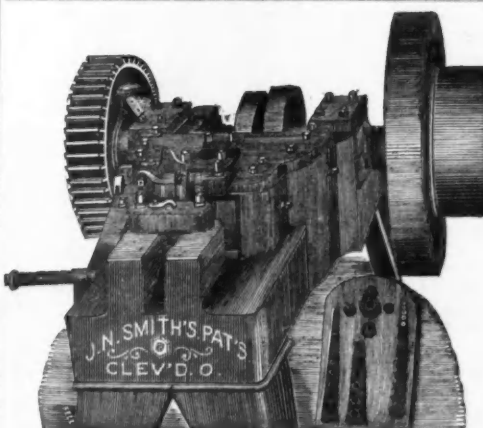
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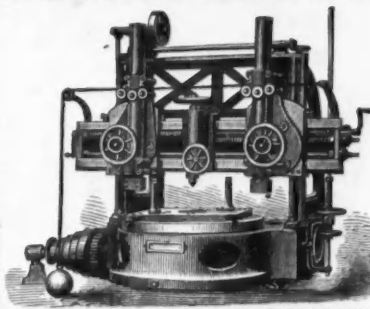


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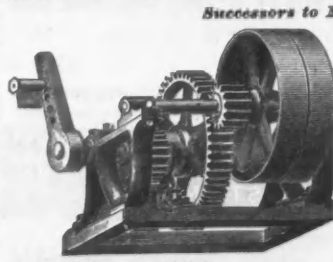
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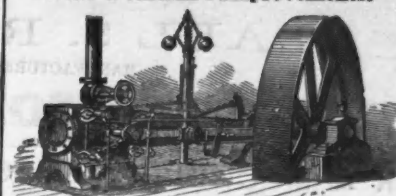
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8 "	4,000 "	50.00	2.00
8 "	5,000 "	75.00	2.20
10 "	8,000 "	95.00	2.40
12 "	12,000 "	150.00	3.75
12 "	16,000 "	225.00	4.75
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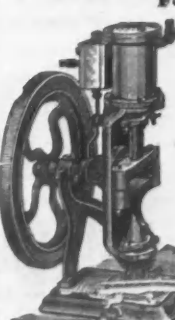
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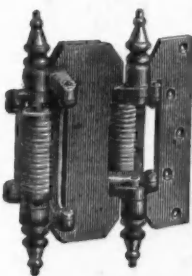
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Will cut faster, wear longer, and clog  
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Carriage Bolts made from Best Square Iron a Specialty.

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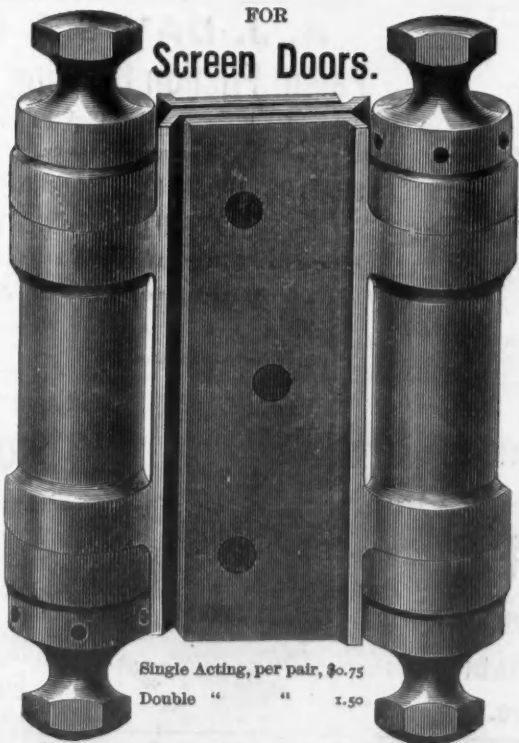
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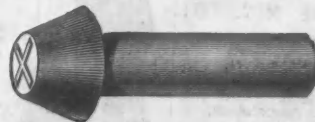
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TRIAL OF THE IMPROVED LIGHTNING SAW.

The Emperor Dom Pedro, accompanied by Director General Goshorn, Superintendent Albert, and others,  
visited Machinery Hall at the Centennial on the evening of June 28th. Among other things inspected, at the  
invitation of E. M. Boynton, of New York, they witnessed a trial of the New Lightning Saw, patented March  
26, 1876. Two men, with one of these saws, cut off a sound log of gum-wood, one foot extreme diameter, in  
seven seconds, or at the rate of a cord of wood in five minutes. Messrs. Corlies, Morell, Lynch, and other  
members of the commission, witnessed the trial and timed the cutting. The Emperor remarked, "That  
was fast, very fast cutting." Last evening the Emperor made another examination of the saw. Philadelphia  
Press, June 30."BOYNTON'S SAWS were effectively tested before the judges at the Phila-  
delphia Fair, July 6th and 7th. An ash log, 11 inches in diameter, was sawed  
off, with a 4 1/2 foot lightning cross-cut, by two men, in precisely 12 seconds, as  
timed by the chairman of the Centennial Judges of Class Fifteen. The speed  
is unprecedented, and would cut a cord of wood in 4 minutes. The repre-  
sentatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England,  
and several other countries, were present, and expressed their high appre-  
ciation." Received Medal and Highest Award of Centennial World's Fair,  
1876. \$1000 challenge was prominently displayed for six months, and the  
numerous saw manufacturers of the world dared not accept it, or test in a  
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Screen Doors.Single Acting, per pair, \$0.75  
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Easily Applied and Regulated.

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Wood Screws,  
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